Railway Maintenance Engineer

Volume 17 CHICAGO—DECEMBER, 1921—NEW YORK Number 12

THE proven design and sturdy construction of Q & C Snow Plows and Flangers embody engineering improvements and patented features which are the result of years of careful study in overcoming obstacles in the particular field they serve.

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RAILWAY MAINTENANCE ENGINEER

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Alphabetical Index to Advertisements, Page 5 Classified Index of Advertisers, Pages 5 and 6

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—and Stays in for Keeps

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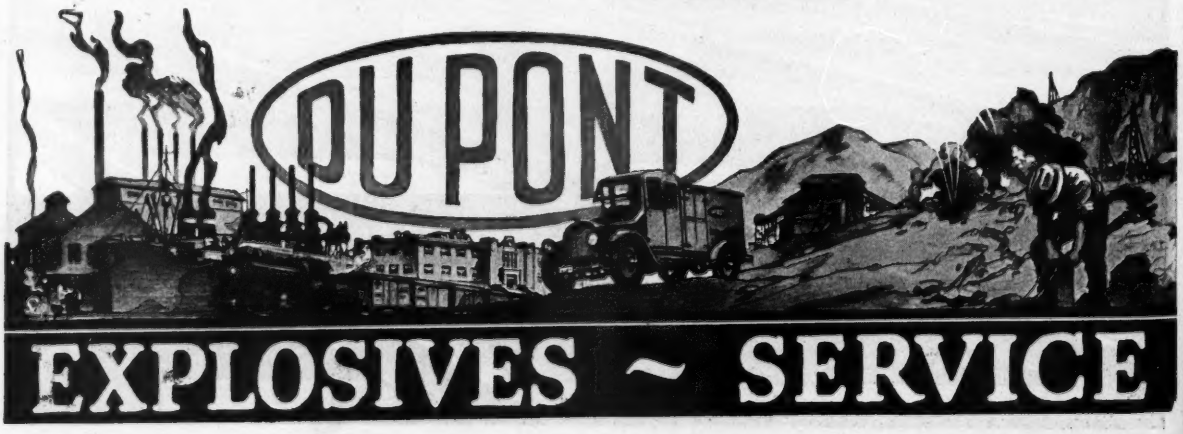

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Gas, Acetylene.
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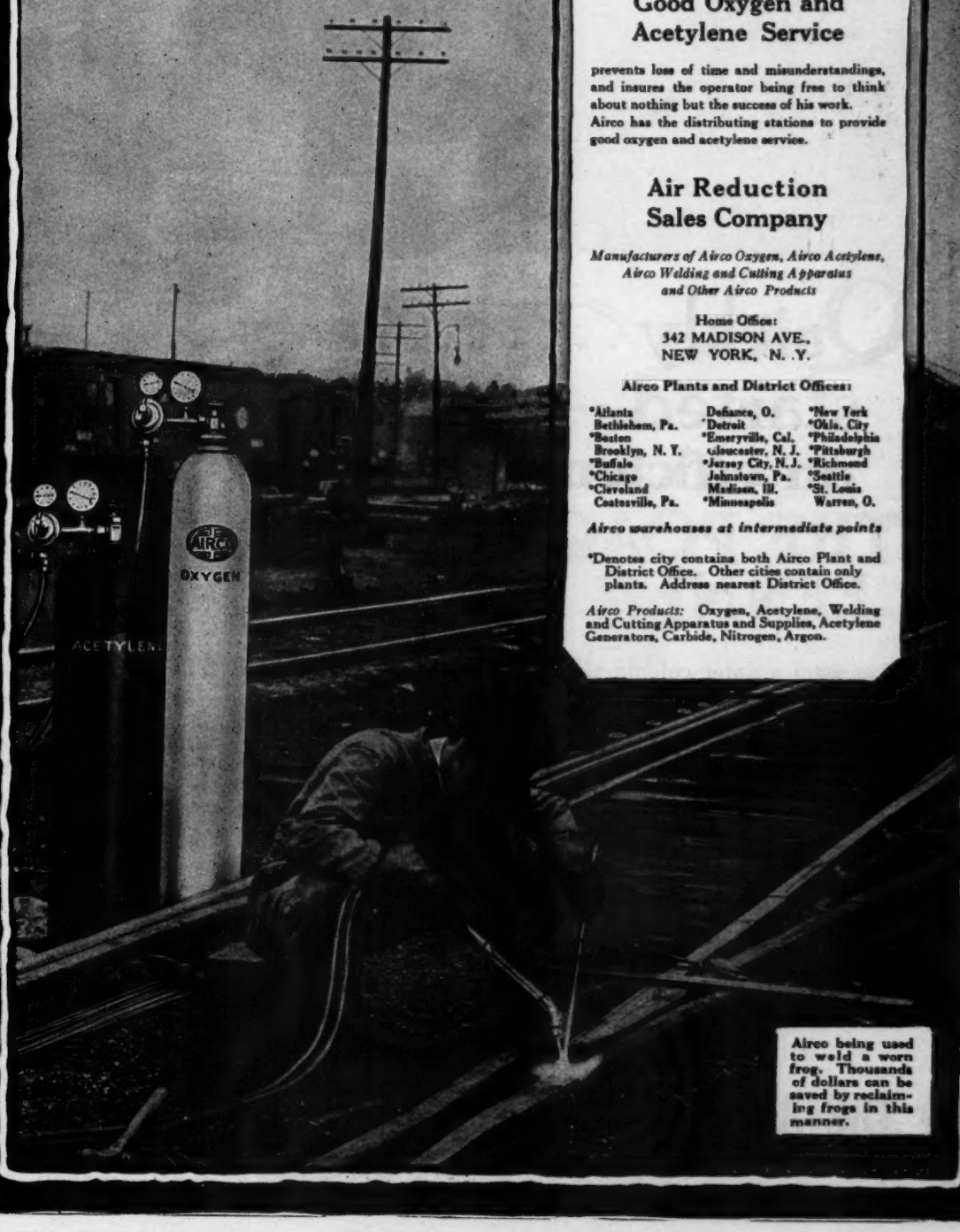

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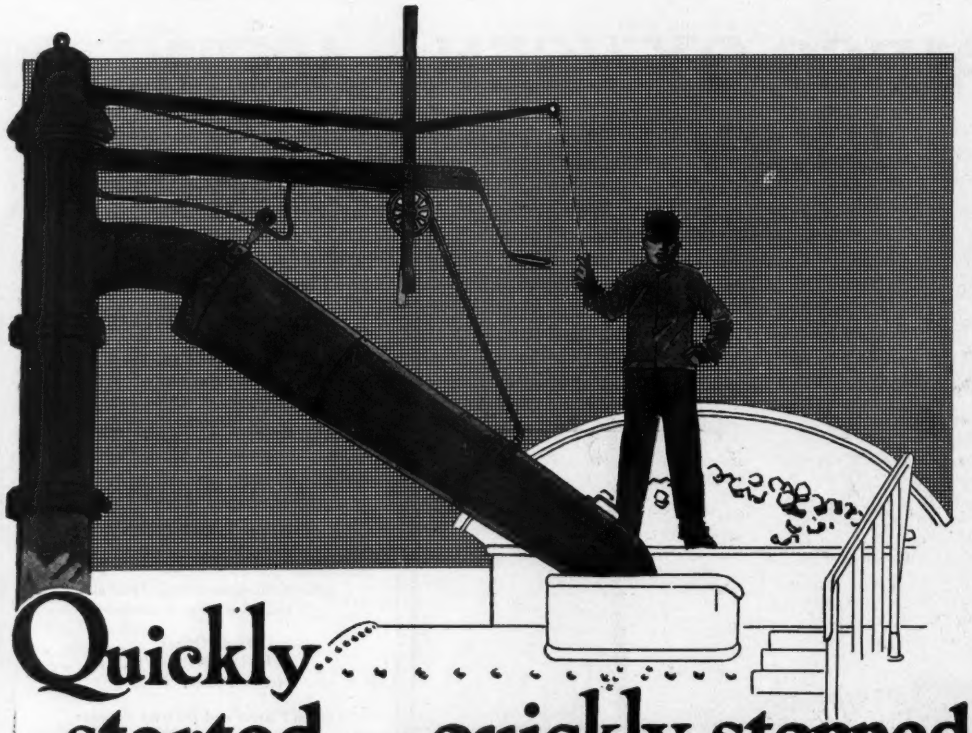

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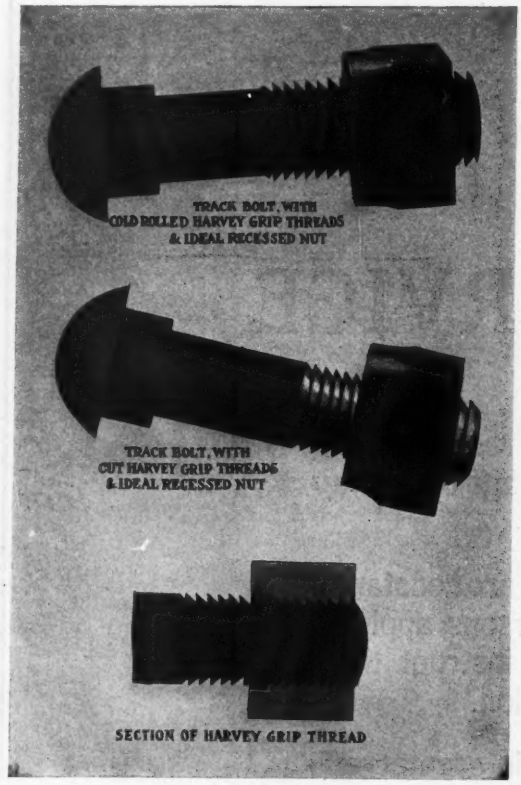
P & M Vaughan Henggi Yardley
Rail Anti-Creepers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& IDEAL RECESSED NUT
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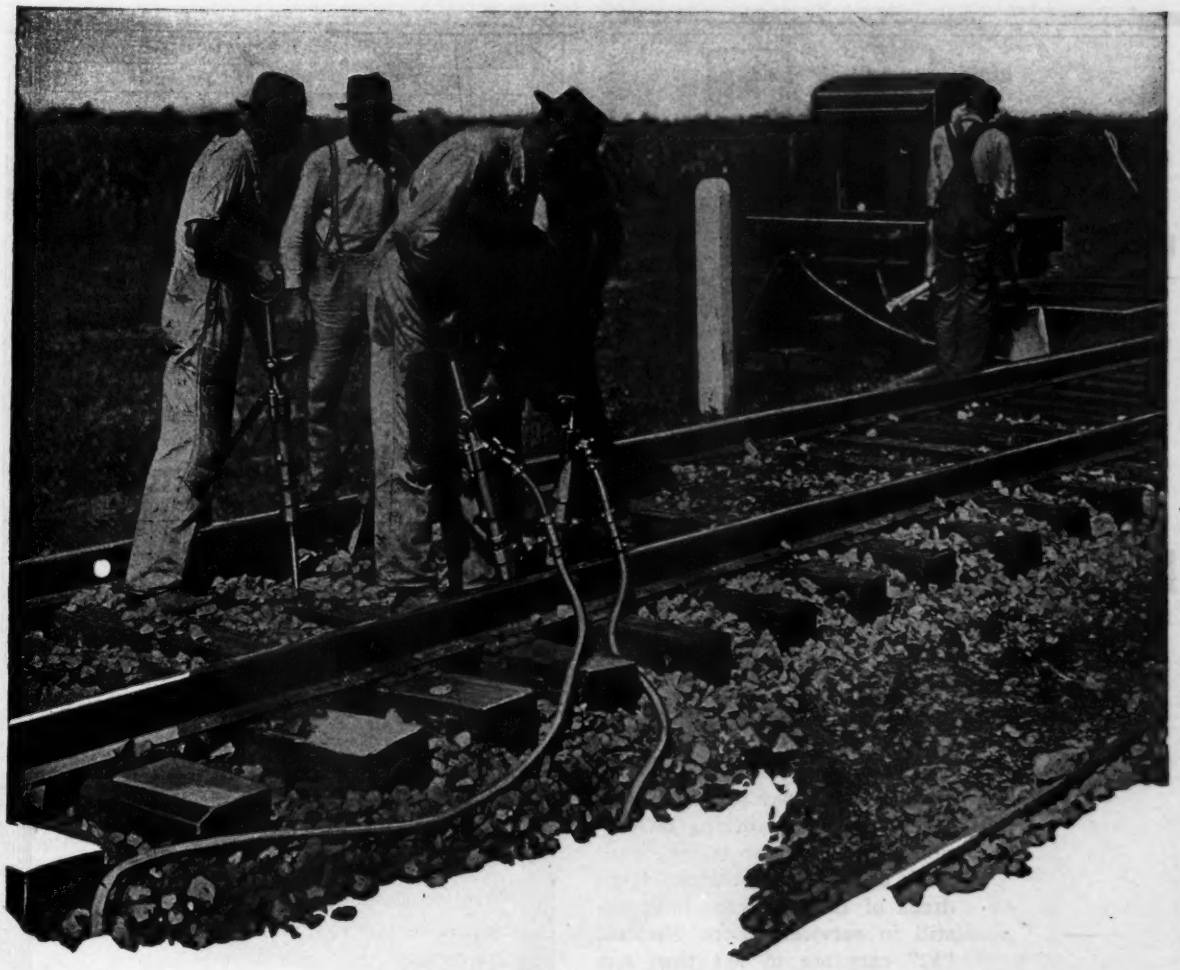

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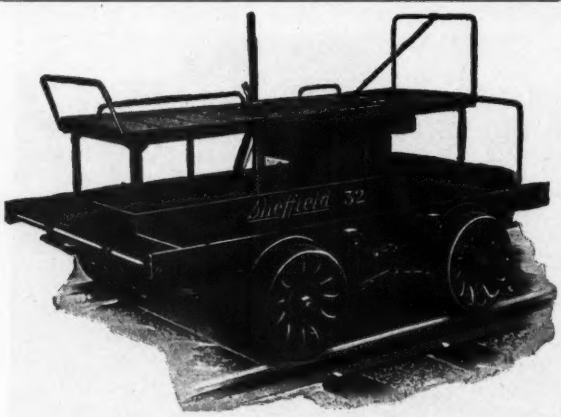

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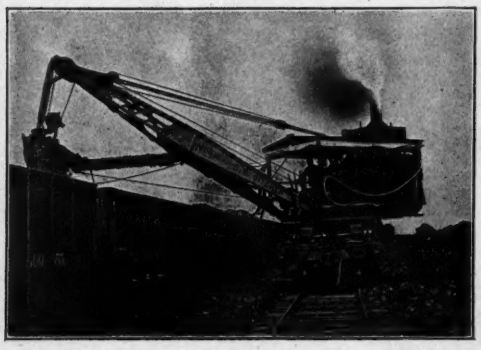

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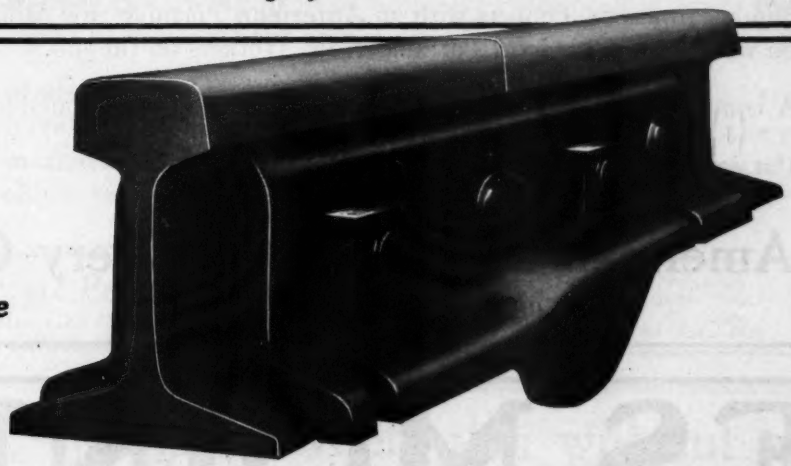

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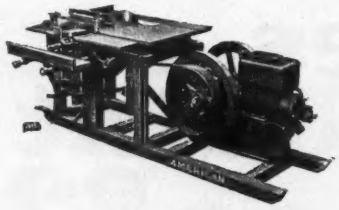

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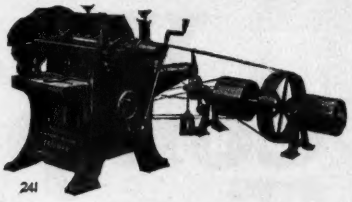

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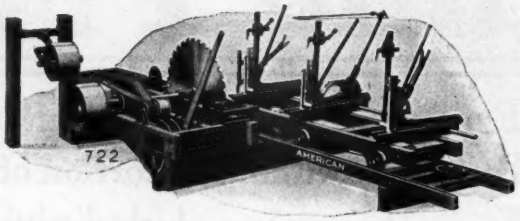

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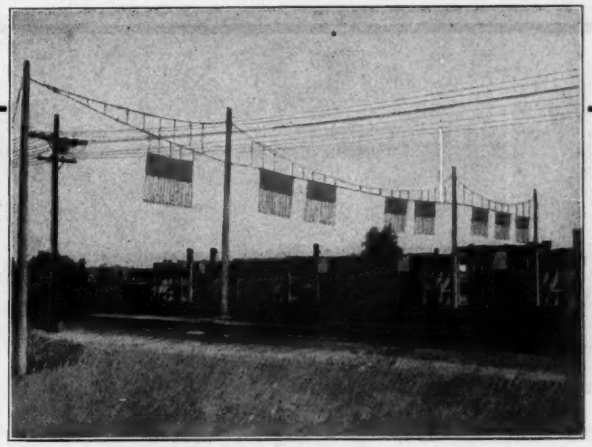

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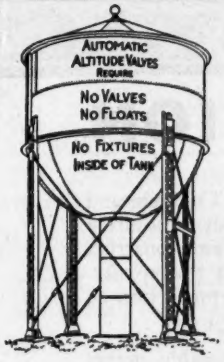

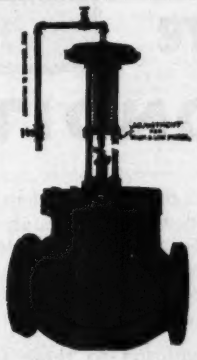

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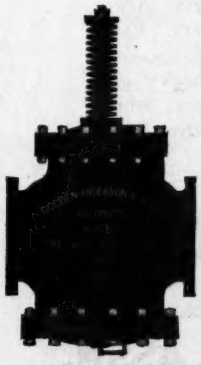

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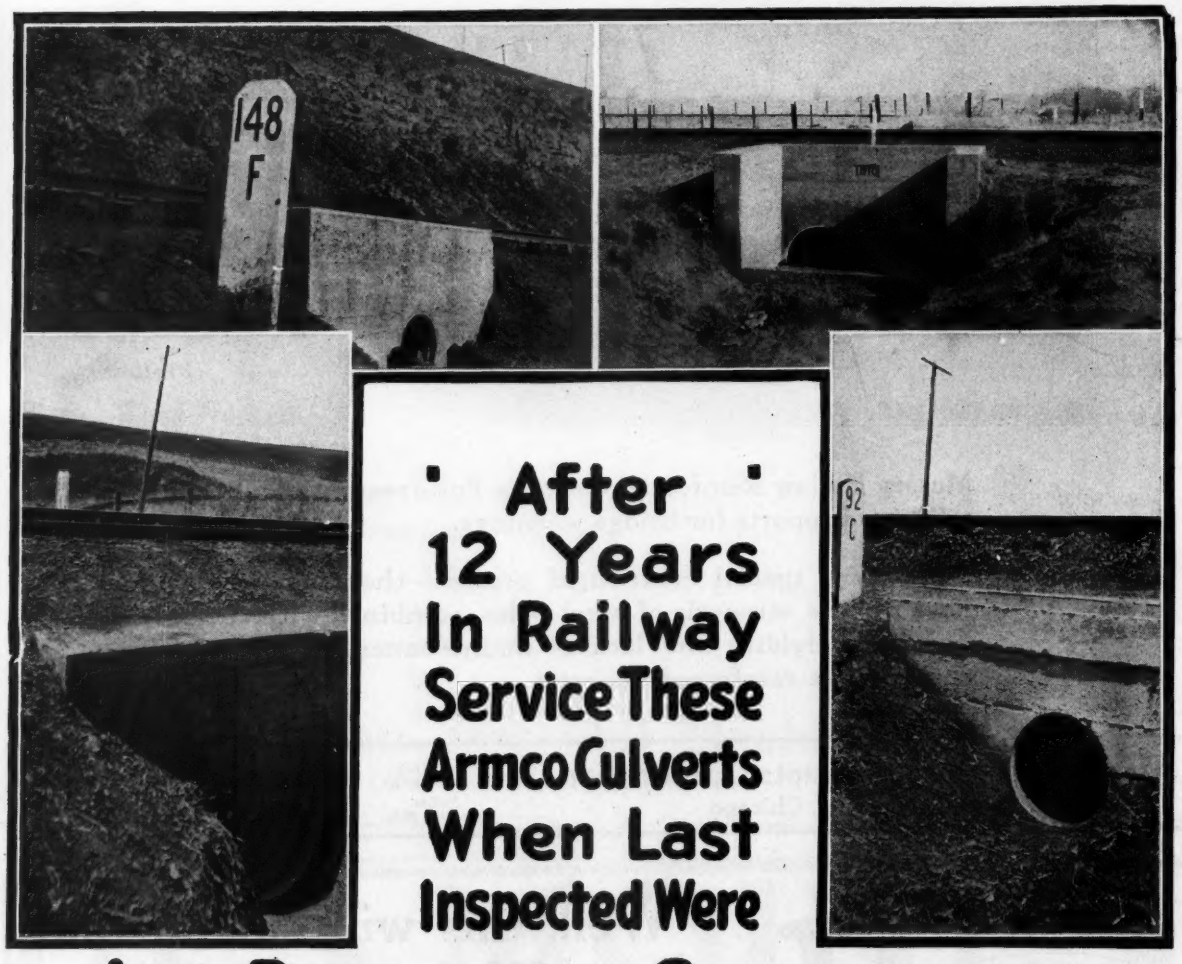

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Railway Maintenance Engineer

Vol. 17 December, 1921 Number 12

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age* and *Railway Engineering and Maintenance of Way.*)

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Do You Want a Copy of the Index

In years past it was the invariable custom of the publishers of magazines to supply an index to each subscriber at the end of each year, but during the war an extreme scarcity of paper compelled them to curtail the use of paper and restrict the issue of indexes to those who had a definite need for them. Inquiry made of subscribers at that time brought out the fact that only a small proportion of the readers maintain a permanent file of the magazines in a form that makes the annual index of value to them. This very naturally has led to the practice of issuing the index only to those who care to have it. If you want the index write the *Railway Maintenance Engineer,* 608 South Dearborn Street, Chicago, and a copy will be sent to you.

The Outlook is Bright

Ample evidence is at hand to show that the railways are getting back on their feet after the disorganization and depression of the last four years. Net operating income has risen with the increase in traffic, averaging approximately $90,000,000 for the months of August and September, the last for which complete statistics are available. This is equivalent to a rate of return of more than five per cent on the valuation of the properties fixed by the Interstate Commerce Commission. These earnings are leading to increased optimism on the part of the railways and are doing much to stimulate buying. Within the last month roads in the United States and Canada have ordered more than 500,000 tons of rails and over $20,000,000 worth of equipment, and are negotiating for further purchases in even greater volume. From present indications, the outlook for next year is bright.

Something to Think About

On October 19, as told elsewhere in this issue, the Railway Fire Protection Association met in Chicago in its eighth annual convention. The facts that this organization held a convention, chose Chicago for the place and made October 18 the convention date manifestly are of no importance in themselves, but to railway men in general and to maintenance men in particular, certain developments occurred in the three days during which this association was in session that *are* important. Not the least of these was the information disclosed that during 1920 nearly 8,000 fires occurred on 75 railroads alone, with a resultant loss in railway property of more than $10,000,000; also that this loss occurred largely from neglect, inattention and carelessness, and that the maintenance of way forces were in no wise innocent of contributing to it. Whatever other significance may be attached to this information, the facts that 8,000 fires and $10,000,000 a year represents 22 fires, with a corresponding loss of $28,000 a day, together

with the information that many of these fires were attributable to carelessness and neglect on the part of maintenance men, certainly exposes the fallacy in any line of reasoning which entertains the theory that the responsibility of fire on anyone's jurisdiction is so remote as not to warrant his daily interest in its prevention, or the theory that the lack of specific instruction relieves him from any responsibility. The possibility of fire is not remote, but ever present, and carelessness or contributary negligence is excusable in no one. Recognizing this and appreciating also that when the railroad loses through carelessness on the part of its personnel, its personnel also loses, whether it be by the necessary curtailment of badly needed expenditures or the impossibility of improving conditions otherwise as a result of such losses, each maintenance man should contribute in some way, whether by supervision or merely exercising carefulness, substantially to reduce this unnecessary loss. It has and is being done on railroads in other countries, it certainly should be done in this country, and, what is more to the point, it can be done if railway men will but do their part.

PILES AND SLABS FOR CONCRETE TRESTLES

IN the June issue of the *Railway Maintenance Engineer* there was published an article describing the methods pursued by the Chicago, Burlington & Quincy in building reinforced concrete trestles. This article was confined to the considerations controlling and the methods pursued in driving the piles, building the concrete caps and setting the slabs. It is now supplemented on another page of this issue by an exposition of the manner in which this railroad manufactures the piles and slabs for use in these structures.

The Burlington has found it advantagous to conduct the erection of these structures with company forces in the form of permanent crews attached to the divisional bridge maintenance organizations and has also established permanent plants for the manufacture of the unit members at four places on its line. The cost of the piles and slabs in place is seriously affected by two important items, transportation and the fixed charge for plant cost. The influence of transportation has been recognized by the railways and by the commercial manufacturers who have distributed their plants so as to cut down the haul to the minimum. The plant charge is also important and unless a great many slabs and piles are to be built, it will usually be found more economical to obtain them ready for use from a manufacturer specializing in this type of construction. Another alternative offered as regards the slabs in some particular cases is to build them in place on the substructure.

WATCH FOR TRANSVERSE FISSURES

NO PROBLEM is of greater concern to track men at the present time than that of transverse fissures in rails. Although first brought to light about ten years ago this form of failure probably existed prior to that time without being recognized; it is, however, of relatively recent development. The product of no steel mill appears to be immune from it and all roads have encountered it. It is a particularly dangerous type because of the difficulty in detecting its presence before failure occurs.

It is highly important that track men adopt every precaution to locate rails containing the fissures at the earliest possible opportunity and remove them from the track before accident results therefrom. This vigilance is of special importance at this season when low temperatures subject the rails to more than ordinarily severe service. It is also important that transverse fissures be recognized when they occur, both to prevent the return of these rails into main tracks and to enable the proper records to be compiled so that other rails rolled from the same heat may be closely watched. Instances are not rare where rails which have broken from this cause have been redrilled and returned to service by the section forces without the nature of their failure being recognized. Such action exposes traffic to danger of further breakages, since it is seldom that a rail which fails from this cause does not contain more than one fissure. Roadmasters and other supervisory officers cannot afford to overlook any precautions which will insure that their foremen are continually on the lookout for indications of transverse fissures and that they be trained to recognize them promptly. Until the cause of this unique type of failure can be ascertained and proper steps taken to remove it, the only recourse is to watch for evidences of it and to remove dangerous rails promptly.

CO-OPERATION IS PARAMOUNT

AFTER the forces of the allied nations united their efforts under a single directing head in the person of Marshal Foch, the defeat of the Germans was assured. United effort is essential for success in any undertaking, but it becomes imperative in the case of an intensive fight, whether it is in actual warfare or in a battle with the elements. In railway service this is exemplified in the critical situations that arise in times of flood, bad train wrecks and blizzards and at this season of the year the last named comes the nearest to the thoughts of the railway officer.

In France, four years of fighting taught the general staffs of each of the allied armies how to perfect and operate a highly efficient machine. But this was not enough, for success did not come until these several efficient units were directed in a way that would insure absolute co-operation. When a railway is confronted with a snow storm, it matters little how efficient the operating, maintenance of way and mechanical departments are directed individually, for no real progress will be made unless the forces of the several departments work together. Without proper co-operation there will be duplication of effort, lost time and unending interference. Of course, a certain measure of co-operation is obtained on every road, but in many cases this is not as complete as it might be.

The series of articles presented elsewhere in this issue and the article by J. J. Navin published a month ago contain numerous illustrations of the opportunities for co-operation. For instance, Mr. Navin pointed out the advantage of abandoning certain tracks in order that the others might be cleared of snow more quickly. This could not be accomplished unless the operating department was willing to give up these tracks for the time. A similar situation arises in the early stage of a very severe storm. If an agreement is reached as to what tracks are most essential, efforts can be concentrated on these tracks and better results produced than if the work was scattered over the entire layout. Another illustration given is that of the methods used on one terminal road to take care of night switching. Instead of holding a gang large enough to keep all tracks clear, the maintenance of way department supplies a trackman to ride each switch engine and clean out switches as needed.

With the snow plow on the front of a locomotive, a thoroughly established institution, it has been but a short step to equip locomotives with steam jets over the rails and thus enlist the help of the operating department in another important feature of the work. The use of steam melting pipes at the turntable pits, cinder pits and water cranes is illustrative of means by which the motive power department can help share the load of the maintenance of way men. A thorough appreciation of the fact that all

departments are working to a common end will do much to bring about a spirit of co-operation.

WE MUST PROVE OUR CASE

THE NEXT three months constitute one of the most difficult periods of the entire year for maintenance of way foremen and supervisory officers, particularly on the northern roads. This does not arise, as a rule, from the large amount of work pressing for attention, but rather from the lack of it. It is due to the long cherished conception that all maintenance of way work must be done in the summer months and that little of a constructive character can be accomplished during the winter. Because of this fact, it is the very general practice of the roads to reduce their track and other maintenance forces in the fall to the smallest number that can safely carry on the routine and emergency work. This commonly accepted attitude toward winter work creates the natural impression in the mind of the foreman that little is expected of him and his men during these months, and this combined with the normal handicap to active work during inclement weather, leads to much "chasing of snowflakes" and other similarly nonproductive work which accomplishes no permanent result.

Maintenance men have long protested against the wholesale reduction of forces at this season of the year and have advanced strong arguments for all-year-round employment. It is self-evident that if such employment can be offered, better men can be secured and held in service than when only temporary work is available. However, it remains to be demonstrated to the satisfaction of most executive officers that the added value of these more experienced employees is not offset by the loss occasioned by their retention during the winter. The first step in demonstrating the economy of permanent forces is therefore to utilize the men now retained throughout the winter in productive work to as large an extent as possible.

There is a great deal of work which can be done during the winter to almost the same advantage as in the summer if the forces are organized to do it. It is necessary, however, that this work be selected with care and that the foremen and the men understand that results are just as essential as in the summer. Best results are secured only when a man or a gang is working to a definite program. It is the province and duty of the supervisory officer to prepare this program with his foremen, bearing in mind that any work of a permanent character which can be carried out will effect a reduction of the peak load in the summer to follow. The ideal force is a uniform force throughout the year. This ideal can be reached only as maintenance officers demonstrate its economy, and there is no better time to demonstrate than now.

If It Were My Railroad

Would I spend my own money as freely as I do that of the company for which I work? Would I renew ties as frequently if I paid for them? The roadmasters on one road to whom these questions were put last spring decided that they would not and the result was a saving of many hundreds of thousands of dollars this year. Do I watch my expenditures for labor as closely as I would if I were footing the bill? In answer to this question, the local maintenance officers on another road decided that Sunday track walking could be eliminated on its lines. Do I see that the men in my gang use their tools as carefully as if I were furnishing them? The foremen on still another road have found that, by increased care, they have been able to cut their expenditures for tools 40 per cent. It is this spirit of personal interest—of trusteeship—that adds to the pleasure of my work and to the success of the company of which I am a part.

LETTERS TO THE EDITOR

HELPING THE FOREMAN

Seattle, Wash.

TO THE EDITOR:

After reading the letter to the editor appearing in the August issue of the *Railway Maintenance Engineer* entitled "Systematize Your Work," I am moved to commend the writer on the views there expressed. Too much cannot be said in urging the roadmasters to help the foreman outline the work he is to do from day to day. It is by no means too much to expect a practical roadmaster to know just what every gang on his district is doing and the amount of work being completed each day unless emergencies arise. This simply means that the roadmaster must go over his district often enough to keep in direct touch with the work in progress. With this plan in effect it is not necessary to outline an extensive program of work. In fact, this is often harmful and confusing. The best plan is to lay out just enough work to keep the foreman busy until he can be visited again.

The foreman should be given to understand that his opinions and views are solicited. Not only will they often be found of value because of his more direct contact with the work, but the attitude which this implies will be a good thing for the foreman. It will build up his spirit. The foreman should be given all possible aid in the proper distribution and supply of materials and tools with which to do the work assigned to him. He should not wait until the foreman asks for the tools he needs, but should make it a point to inquire if he has what he wants.

A good man never objects to being taken to task in the right sort of a way. However, it is also well to commend a man for good work well done. The right kind of a man greatly prefers to be called to account for inferior work and to receive credit and recognition for what he accomplishes than to have his superior overlook him entirely.

Economical results are being obtained this year owing to the fact that money is being expended only for the most essential work. Weed cutting has been dispensed with and the dressing of ballast shoulders is being omitted, together with any other work concerned only with the appearance of the property. This policy, together with the higher standard of efficiency secured because of the present condition of the labor market and the relatively higher wages paid, has done much to secure maximum results for the money spent.

These are times when every effort must be made to put

forth the best effort. Earnings are restricted so that every dollar must be made to count. The roadway department will always offer a broad field in this regard. Much will be accomplished by creating a feeling of cheerfulness and inaugurating a campaign encouraging all men to do their part in tiding over the period of financial stress and adverse conditions. It is a poor roadmaster who cannot save his railroad money, but this must be done by a close contact with the work under his direction, so that he will be able to detect the places where labor is being lost.

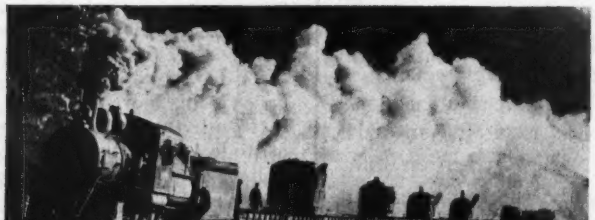
J. J. HESS,
General Roadmaster, Great Northern Railroad.

LABOR SAVING EQUIPMENT AND WORK TRAIN SERVICE

Wilkesbarre, Pa.

TO THE EDITOR:

In the August issue of the *Railway Maintenance Engineer* there appeared a short article on the loading and unloading of rail with locomotive cranes which pertains to a feature of maintenance, namely, work train service to which the Lehigh Valley has given unusual consideration for many years. There is no question but that two or more locomotive cranes can be utilized with one work train loading or unloading rail, and that this is the most economical method of doing work of this character. In the article mentioned it was suggested that two locomotive cranes be used with one work train. In this connection the statement might be of interest that on May 6, 1915, 171,988 ft., or 16.28 track miles, of 90-lb. rail was loaded along the main line of the Lehigh Valley in one day with one work train and nine machines, comprising



A Train with Four Cranes Working on the Lehigh Valley

three locomotive cranes, two ditching machines, two air loaded 85,494 ft. of new 100-lb. rail on the main line in ary 29, 1916, one work train with seven machines unloaded 85,494 ft of new 100-lb rail on the main line in one day between the hours of 6 a. m. and 6 p. m.

In these operations the rail was loaded and unloaded on a stretch of double track. Single line was operated to facilitate the work for several hours in the morning, but the balance of the day's unloading in both cases was done on double track. Such work was done under normal traffic conditions and without any detention to operations.

In addition to this work a large number of cars of ashes and ties have been released with one work train in one day. There have been unloaded as high as 125 cars of ashes, or approximately 3,750 cu. yds., along the main line with one work train in one day. At the time this was done there was no great demand for coal cars and the ashes were allowed to accumulate so that a great number of cars could be unloaded in a day with the least work train expense. This was the situation also with respect to the work of unloading new ties, as many as 12,000 ties having been unloaded in this way in a day with one work train. It was necessary, however, to prepare an organization for such work and assemble forces at convenient points along the line to release those cars.

It has been the practice of the Lehigh Valley for the past eight or ten years to use all the machines available with one work train, loading or unloading rail, or similar work.

F. N. LOUGHNAN,
Division Engineer, Lehigh Valley.

SHALL THE FOREMAN STRING LINE HIS CURVES?

Philadelphia, Pa.

TO THE EDITOR:

The discussion which followed the presentation of a paper on the string lining of curves at the last convention of the Roadmasters' and Maintenance of Way Association indicated some doubt as to the ability of the track foreman to carry through the entire process involved in this work. Some of the supervisors seem to feel that only the supervisor or his assistant should perform either the field work or the computation. On the other hand, Rule 304 of the Manual of Rules for the Guidance of Employees of the Maintenance of Way Department, in the report of the Committee on Rules and Organization of the American Railway Engineering Association, states that "ordinarily the section foreman, assisted, if necessary, by the supervisor, can line the track very accurately and secure practically perfect riding curves by the use of a string." It will be interesting to develop which of these two divergent views is the more nearly correct.

The process of solving problems in curve adjustment, except of course in the extreme case where a curve is badly out of line, involves no calculations which a foreman possessing a knowledge of simple arithmetic cannot master. It is certain that the ordinates can be measured with as much accuracy by the foreman as by an engineer and, if the solution is not made as quickly, the chances are that the final result will be equally satisfactory. The computation of the average ordinate, the study of the required adjustment, that is, where the throwing should be inward and where outward, the amount of the maximum throw at a sharp or flat place and the further throwing at adjacent points, these and other features which go to make up the science of string lining have been so simplified that the method may be grasped readily by almost all foremen.

Has anyone ever heard of a supervisor forbidding his foreman to use the string? On the contrary, all supervisors will agree that a foreman will improve his track by the use of the string, even though he may not obtain the perfect result in every case. If he should err in his calculations, his eye will quickly show him that a false solution has been reached. It may be stated confidently that in no case is any element of danger to the movement of traffic presented by the use of the string by the foreman.

Many supervisors, recognizing the desirability of the foreman being able to effect the adjustments of a curve of his own account, have taken pains to supply the assistance contemplated by the committee of the American Railway Engineering Association, and it is not out of the ordinary, at least in this locality, to find foremen who can now do this work efficiently without help from anyone. Then by all means let us encourage foremen everywhere to study some system of string lining. The satisfaction which comes with the performance of work of an engineering nature will inspire the foreman to persist in the adjustment of his curves and this will obviate the necessity of the general relining of the curves, which occurs sooner or later when detailed adjustments by the foreman are neglected.

W. F. RENCH.

Cleaning Up a Snow Fall in Chicago

SNOW FIGHTING MEANS PREPARATION

Discussion of Winter Problems Brings Out the Importance of Making Ready for the Storms in Advance

IN LAST month's issue a paper by J. J. Navin, supervisor on the Pennsylvania System at Chicago, outlined the organization and general methods pursued in the handling of snow in busy terminals. There are many different angles to this problem, but all of them point to the need of adequate preparation before the rigorous winter weather has set in. This not only implies adequate drainage to take care of the ice formed from natural or artificial snow melting, but also the acquisition of such special equipment as has been found to save labor. Of particular interest is the co-operation which may be given by the operating department through the equipping of locomotives with steam jets. These and other special details of the snow fighting problem are presented below by trackmen from various parts of the country:

PREPARING FOR WINTER IN CANADA

By E. KEOUGH

Assistant Engineer Maintenance of Way, Canadian Pacific, Montreal, Que.

YARDS in Canada contain but little special switch work. Consequently, they create no particular problem in the winter time. However, every possible effort is made to use track designs of a type that offer the minimum chance for trouble during snowstorms. The slip switch is a great nuisance, for there is nothing to do but to dig it out. The use of spring frogs is avoided wherever possible for the same reason. One piece guard rails with ice-clearing arches are now main line standards. Switch stands are rigid and very simple, of open construction to allow for ready inspection and cleaning.

In the district north of Lake Superior, the turntables are all covered. The use of steam pipes in the turntable pit is also an advantage and with proper arrangements they can be made to melt all of the snow which falls in the pit as well as that cleaned from other tracks and thrown into it. At water cranes boiler tube gratings are provided with steam pipes underneath so that there is little opportunity for the drip from the spout to freeze.

On coach tracks, drill tracks, etc., a great saving of labor is accomplished by the use of a spreader car with teeth on the blades. However, these teeth must be kept sharpened to the proper angle to be effective. Spreaders are also of great value in clearing yard tracks.

TRACK PANS IN WINTER TIME

By GEORGE T. DONAHUE

Assistant Supervisor of Track, New York Central, Rochester, N. Y.

TO KEEP tracks in proper condition in the winter at water pans we maintain the base of rail approximately three feet above sub-grade, using No. 2 stone ballast free from dirt. At our pans the outside shoulder is paved with large stone blocks at a very sharp slope; the shoulders between tracks are paved similarly except we have a paved gutter 12 in. wide in the center of the ditch between tracks. This gutter is given a longitudinal slope of approximately 12 in. in 25 ft. At intervals of 25 ft. we break the slope of the gutter and run the water to 12 in. wooden drain boxes installed at intervals of 50 ft. running crosswise under the tracks with a sufficient fall to get the water off the roadbed quickly. The track is paved beyond the ends of the water pans for a distance of 150 ft. to take care of overflow.

The actual clearing of snow and ice at the pans consists of picking the ice by hand just enough to loosen it so that it can be plowed off by the use of a spreader. It has been cheaper to plow off the snow with a spreader before it has been left long enough to form ice, and to remove all snow and ice to the remotest point on the right-of-way at the beginning of the season and thus prepare for later storms.

At the interlocking plants the ice is removed from switch joints by the application of "hydro-carbon," a by-product of Pintsch gas, with portable hand sprayers, furnished

by the railroad. The "hydro-carbon" is kept in special tanks holding about four barrels. It is very efficient for removing ice and small falls of snow, but is impractical for large snow falls due to the amount of water it causes to be formed. Each switch has a manhole, which is connected to the main drainage system. We remove all snow from the vicinity of switches, even though the amount at the time is not troublesome, and are thus prepared for the next storm. All towermen have the addresses of foremen and section men and call them directly if a sudden storm comes during the night. This prevents the delay which would result if men had to wait for the supervisor to notify them.

BROOMS AND SHOVELS ARE THE ESSENTIALS

BY JOHN EVANS
Division Engineer, Michigan Central, Detroit, Mich.

IN TERMINALS in this vicinity work made necessary on account of winter weather conditions is principally at switches and interlockers and in the vicinity of engine terminals and coaling stations. Ordinarily not much work is necessary in removing snow from ordinary yard tracks back of the switches. As a step toward reducing winter troubles, preparatory measures, such as removing ballast from around and between ties at switches and the cleaning out of drains and the removing of obstructions around catch basins are taken care of as winter approaches. A study of the difficulties of the previous winter will often call to mind places where the lifting of a track or the putting in of additional drainage facilities will ward off trouble later.

In removing snow from switches we depend almost entirely on brooms and shovels. If the snow has hardened or sleet or ice has formed, kerosene hand torches are used in cleaning interlocked switches and connections. They have not been used at non-interlocked switches. At these switches it is possible to use salt, which is not advisable around interlocked switches. Around interlockers the trackmen work with and to some extent under the instructions of the interlocking men who keep in touch with the tower operators to find out what particular routes are wanted, disconnecting and operating by hand such switches as cannot be cleared promptly.

The interlocking department has tried to keep snow and ice melted by a stationary heating apparatus. One appliance used was a kerosene torch, which plays a long flame into an iron casing about seven feet long. This was attached outside the rail at the switch or movable crossing points. The casing was perforated on the side next to the rail. The use of this apparatus has been discontinued, as it was found to require so much attention to keep it burning properly, especially during high winds. Experiments have been made by the electrical department with electric heaters to keep switches clear of snow and ice, but opportunity has not yet been had to find out what these will do under severe weather conditions. Current for these heaters is obtained from the third rail.

In one section on which the greater part of the switches are in paved streets, we have had difficulty in providing drainage for the switches; in fact, for the greater proportion of them there is no drainage. The switching in this particular territory is done entirely at night. During storms or during times when freezing and thawing weather alternates quickly, trackmen accompany the engines while switching is being done so that switches can be cleared out if necessary just at the time it is desired to use them. In getting water out of these switches a small hand pump is used.

Leakage and waste of water from locomotives are responsible for a great deal of trouble around switching leads during the winter and the co-operation of the locomotive department in reducing such waste and leakage to a minimum is valuable. In this territory we have been able to form a rather accurate idea of the amount of work necessitated on account of water from locomotives for the reason that we have one large interlocking plant over which nearly all switching is done by electric engines. The trouble with ice at this point is negligible compared with the trouble in similar localities where switching is done by steam locomotives.

When it is necessary to remove any considerable quantity of snow from any localities it is usually loaded on flat cars by hand. Practically no use can be made of snow flangers or snow plows on account of the large number of obstructions. Occasionally side levellers have been used in removing snow from yard tracks where there is space alongside such tracks where the snow can be allowed to remain in piles. In taking away snow from team tracks and freight house driveways it has sometimes been found cheaper and more expeditious to load snow on wagons for disposal instead of on flat cars. On a portion of this terminal a river adjacent to the railroad property furnished a convenient place to dump snow loaded in wagons. The possibility of using wagons instead of cars in places which can be reached by wagon is well worth investigating.

As a rule, the removal of snow and ice is taken care of by the regular forces. When times are good and work is plentiful it is almost impossible to pick up extra men locally to handle this work should they be needed. Men, unless actually in need, will not endure the hardships due to weather or incur the danger incident to the work. In a few cases where men have been hired through labor or charitable agencies it has been necessary to issue pay checks to the extra men at the close of each day. At one terminal on this railroad but not in this immediate vicinity help has been obtained during a severe storm by using convicts from a near by prison.

In calling the forces after hours it is an advantage if the roadmasters and foremen in the important yards have telephone service in their houses. In some cases this service is paid for by the railroad. Through this arrangement these men can be reached promptly when needed. Furthermore, when they are in doubt as to whether or not they are needed on the tracks on account of weather conditions, they can inform themselves by phone whether or not there is any trouble and by so doing can avoid being out under pay when not actually needed. A great many of the regular laborers and sub-foremen live in cars or bunk houses on the right of way. While such an arrangement may not be desirable from every standpoint, it is of material advantage in making it easier for to reach these men in case of bad weather or other emergencies.

HANDLING SNOW IN CLOSE QUARTERS

BY G. G. AUSTIN
General Roadmaster, Chicago Junction Railway, Chicago

IN THE fall, anticipating a normal winter, the Chicago Junction equips two locomotives with specially devised steam pipes, which are used to melt the snow and ice and clean out flangeways on leads and turnouts, and where necessary along the main tracks. As a rule, on main tracks and principal sidings, where there are no switches to contend with, a flanger is used. This is made from a flat car with a small enclosure on one end containing the levers to use in raising and lowering the blades which clean away snow from both sides of the rail for a distance of about ten inches.

A night track gang is generally put on about Decem-

ber 15, consisting of a foreman and eight men, all of whom are, as a rule, familiar with all parts of the yard, and they keep in close touch with the office of the night general yardmaster, who directs them according to calls received over the phone from district yardmasters and conductors in charge of switch engines. When conditions are such that the night gang cannot handle them alone, a call is made on some of the regular day force who live nearby or in a camp maintained by the company, but in severe night storms when wind is blowing and snow drifting, one man is generally detailed with a snow broom and a No. 2 shovel to ride on each working engine and clean out switches as they are used, thus saving the force as much as possible for daylight work. Preference is generally given to the main line switches and to the switches in tracks serving unloading chutes to insure as little delay as possible in the handling of stock, which generally arrives between midnight and eight o'clock the following morning.

In addition to the method herein outlined for meeting snow problems, the company maintains a supply yard and storeroom for the maintenance of way department, which is centrally located, where a large stock of snow shovels, snow brooms and salt is carried, and not later than November 1 all section gangs are furnished with a liberal supply of everything at their respective toolhouses for immediate use. When the winter is unusually severe and the snow deep it is generally necessary to resort to the use of work trains and scoop shovels to load the snow and haul it away, as one of the hardest things to contend with in this terminal is lack of space to pile snow because tracks and switches are so close together.

STEAM PIPES KEEP CINDER TRACKS CLEAR

By Frank Sindelar

Assistant Supervisor, Baltimore & Ohio Chicago Terminal, Chicago

THE LOADING of cinders from a water cinder pit at the engine and coach terminal of the Baltimore & Ohio Chicago Terminal at Lincoln street caused a great deal of trouble each winter until a steam pipe was installed to keep the track thawed out. About twice a week cinders from the pit are taken out by a locomotive crane and clam shell bucket and loaded on cars standing on adjacent parallel track. Next to this cinder track are two tracks used for all outbound movements from the roundhouse and turntable.

The water draining from the cinders not only floods the cinder tracks, but also the two adjacent tracks and in freezing formed ice higher than the top of rails. Twelve to fifteen men were required daily during extreme cold weather to keep the tracks clear of ice. But the greatest trouble was experienced when pulling out the cinder loads. The cars were glued tight to the track by the ice. It was next to impossible to clear the rail underneath the cars which had to be bumped loose by the engine one at a time and derailments resulted with great delays to engine crews. The climax was reached in the severe winter of 1917-18 and as an experiment arrangements were made to lay a steam pipe on the cinder track.

The result was a surprise. The pipe melted the ice, water formed around them, became heated and kept melting the ice further and further out. In a few days the frost was out of the ground in spots where the water could not get away and seeped into the ground. After that there was no more trouble with ice around the ashpit. The pipes are disconnected every spring and reinstalled in the fall.

The equipment is simply a one-inch pipe. The first winter that we used it, it was laid on top of the ties inside and near the rail for the required distance. Elbow joints and a four-foot piece of pipe was used at the far end of the line to loop back along the opposite rail to any required distance. A check valve is used at the end of the pipe to check the escape of the steam; it being allowed to escape only through a small opening.

This contrivance was found to be more than adequate, so the following winter only one line of pipe was laid outside of the track along the end of the ties with a single branch at right angle leading to the pen-stock waste basin. At the basin the size of the pipe is reduced to ⅜ in. and is coiled around the basin cover to keep the drain openings from freezing up. This later system has been found more economical and is sufficient to keep the ice from causing trouble.

THE OPERATING DEPARTMENT CAN HELP

By A. M. Clough

Supervisor of Track, New York Central, Batavia, N. Y.

THE METHOD used by a large Canadian railroad for removing snow from switches offers a suggestion for the partial shifting to the operating department of the burden of keeping switches clean. In large terminals this road has one of its small switch engines equipped with a steam nozzle front and back close to the rail and when a switch that is snowed in is needed the engine runs over it and melts the snow and ice or blows it out. When storms are of long duration several engines so equipped are used. There is no question about the success of the work, provided the drainage is there to carry off the melted snow.

There is also "hydro-carbon" as well as other materials for melting snow from switches, frogs and guard rails; also the electric snow melters. No matter how heavy the snowfall they do their work without anyone near and with no risks to men who must be out in a storm performing the most dangerous of all a trackman's duties. In each case good drainage is necessary, and this should be provided in all large yards.

Of course, there will always be the snow to remove outside of switches, and no really new devices have been provided for this, except the man, the snow shovel and the snow train. But experience has taught us that just as soon as one storm abates, snow should be hauled away to prepare for another. Wherever possible in designing large yards, a thought should be given to winter conditions and plenty of room left between main switch leads, hump tracks and buildings, where snow can be shoveled when storms are of long duration, and thus save the necessity of having to use snow trains until the storm is over. It has always been my endeavor to be thoroughly prepared for winter conditions, both as to organization, tools and conditions on the ground, and in this connection, particularly where there are power-operated switches, to have perfect drainage with a deep catch basin opposite each switch, and the ballast removed to nearly the bottom of the ties. As we have very high winds in most of this territory in winter, we find that the wind keeps most of the exposed switches comparatively free from snow.

Men who formerly worked 12-hr. shifts on switches now work 8 hours, and men from the day forces go in as soon as a storm is impending, to be ready to take up their shifts at night, so that no special calling of men is necessary. Each man knows his place and each group has a foreman or assistant foreman to supervise it. All crossing frogs and guard rails are cleaned and salted in daytime, so that night men only need to keep the points of switches clean. At daylight a flanger is used slowly through all main sidings and leads, which gives yard

men a clean center of tracks to walk in and just as soon as the storm abates the snow train is requisitioned and all high piles of snow hauled away ready for another storm. In these parts it is never the steady, heavy snowfalls that cause trouble, but the frequent and very high winds and snow drifting. Brooms are posted at outlying switches, so that trainmen using the switches will clean the points themselves, and at large interlocking plants we work in harmony with the men of the signal department, even to furnishing the men snow shovels and brooms, when needed, and in return we get all the assistance from them that they can give.

HAND TORCHES ARE EFFICIENT

By T. F. DONAHOE

General Supervisor of Road, Baltimore & Ohio, Pittsburgh, Pa.

THE CLEANING of snow and sleet from switches and other special track work is handled very well with portable hand torches or thawing outfits. The Baltimore & Ohio has used one type of torch with a great deal of success. These torches burn kerosene and consist of a can fitted with a hand air pump for pressure, which causes the kerosene oil to flow through a hose attached to the can. On the other end of the hose is a pipe about ⅜ in. in diameter and 3 ft. long, used as a handle with a nozzle at the end, through which the kerosene sprays. To this pipe is attached a cylindrical burner 3 in. to 4 in. in diameter and 6 in. to 8 in. long with holes for air. The air mixes with the spray and burns, giving a flame about the size of the cylinder and which shoots 10 to 18 in. beyond the end of the burner, according to pressure kept in the tank by the pump. It blows as well as burns, cleans the switch points very quickly and in case of sleet or ice quickly melts the ice. It also leaves a coating of the spray so snow doesn't stick as readily. The burners come in two sizes. The one-man size holds about 1½ gal. of oil, and the operator carries the can in one hand and the burner in the other. The two-man size holds three gallons of oil with two burners to each can, the men carrying the can between them and burners in their other hands. We have found the small ones better for ordinary work. The burners have to be heated by holding them in a stove, over a fire, or over a handful of waste with oil on it. We have them at interlocking plants, yards and large stations where large platforms must be cleaned. The torches pay for themselves in one year in the saving of labor and will last several years. We also use them to heat stock rails for bending and have made some tests with them at burning wheat out of stone ballast. One man can burn it out faster than three men can remove it otherwise.

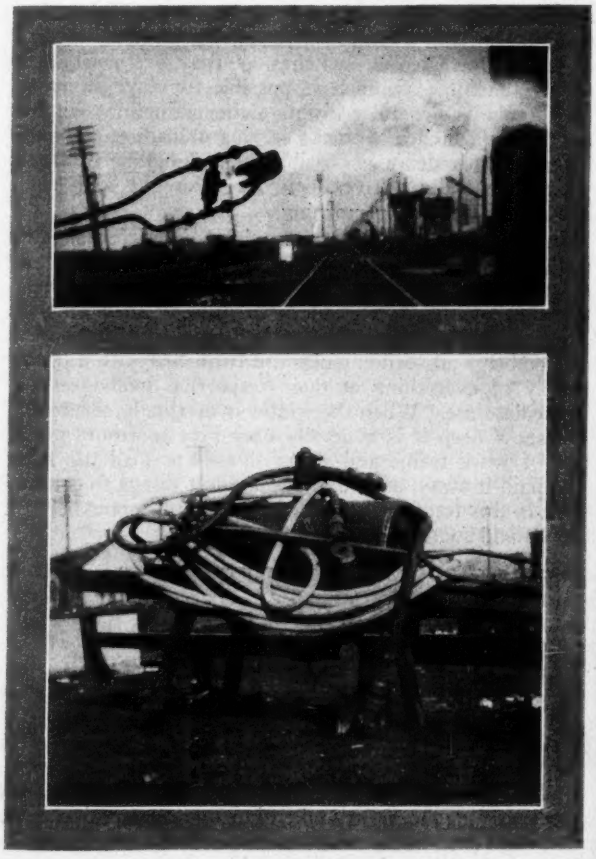
A HOME-MADE SNOW MELTER

By L. COFFEL

Track Supervisor, Chicago & Eastern Illinois, Momence, Ill.

AT THE Yard Center (Chicago) terminal of the Chicago & Eastern Illinois considerable use is made of some semi-portable snow melters designed for use in connection with the compressed air supply and provided with 50-ft. of hose so that the nozzle may be carried some distance away from the fuel supply. This outfit consists of four eight-gallon tanks mounted on wheels or portable carrying frames. The tanks are kept supplied from a large storage tank with a capacity of 3,500 gal. The oil used is about a second or third grade of kerosene. The portable tanks are connected with an air line, which is kept supplied with air pressure from the air brake testing line which runs through the train yard nearby. The air connections are made with regular train line air hose connections and are easily disconnected when not in use.

These small tanks are fitted with two lines of ¾-in. rubber hose each about 50 ft. long, which serve as supply lines for compressed air and oil for the burner to which they are attached. The burner was devised by the general car foreman at Yard Center shops and consists of a piece of three-inch steam pipe, eight inches long, to serve as a shield, and two six-foot lengths of ¾-in. wrought pipe, attached to the two lengths of hose These two pipes



A Home-Made Snow Melter on the C. & E. I.

serve as a handle for the operator and feed the air and oil to the burner outlet The flow of air and oil is controlled by a small globe valve fitted to the junction of the oil and gas pipes.

Before these burners can be used they must be heated, for which purpose a small smudge pot is used, which contains a small quantity of coal fire A burner must be held in this for about five minutes to generate the required working pressure. These burners throw a strong, hot flame a distance of six to eight feet and further when operated out of the wind. This outfit has been used for four years and has proven successful

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REDUCING CATTLE KILLING.—On December 1, the Illinois Central will inaugurate a campaign to reduce the killing of live stock by trains. Section forces will be instructed to be on the lookout for broken fences, gates and cattle guards and farmers along the right-of-way will be urged to co-operate more effectively along these lines. Similarly as in the coal saving campaign, which the Illinois Central inaugurated in September, and which is reported as having been attended with very satisfactory results, this campaign will be given wide publicity.

DYNAMITING SUB-STRATA OVERCOMES SLIDES

Breaking Up of Rock Foundation Allowed Water to Escape and Solved Aggravating Problem

By C. M. McVay
Division Engineer, New York Central Lines, Charleston, W. Va.

DURING the building of the Kanawha & West Virginia's new line from Gauley Bridge to Belva, W. Va., between September, 1917, and June, 1919, a bad slip occurred at Belva, the handling and relief of which gave rise to very interesting problems. The slip extended a distance of 900 ft. along the new line. The maximum depth of cut on the center line at this point of the slide was about 30 ft. and the preliminary sections called for 22,559 cu. yd. of excavation. When construction work was completed, however, a total of 75,361 cu.

Clearing Up Another Slide

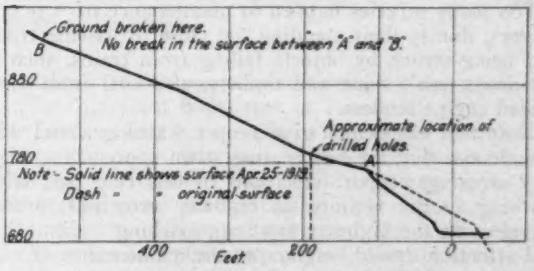
yd. had been removed and since that time about 800 yards additional have been taken out by a ditcher.

C. W. Marshall, a contractor of Kansas City, Mo., started work in this cut in the latter part of September, 1917. The weather was very dry at that time and by November the cut had been made and the work was thought to be completed. About the middle of December, however, wet weather set in and after two days it was impossible to tell that a shovel had ever been in the cut. A county road ran along the lower side of the cut and as the cut filled in the earth not only completely covered the new railroad grade, but the county road as well, the grade being buried to a depth of about 18 to 20 ft. on the center line. The county road was made passable at once by team work, but as the contractor's equipment had all been moved down the river to the next cut, further work in the cut was postponed until spring.

About the middle of May, therefore, after the earth had thawed out and dried thoroughly, the excavation of the slide was begun and it was all but completed when a recurrence of rainy weather brought on another slide, making it necessary to remove the shovel for a few days. As soon as the weather cleared up another cut was then made through the slip. This cut stood in good shape for several weeks, as a result of which the standard track was laid at this point, but in September, 1918, during a wet spell, another slip occurred and the track was entirely covered. The shovel cleared this earth away by casting it over to the side adjacent to the county road, from which location the material was then loaded into cars on the main track. Immediately after this was done a temporary track was constructed along the side of the county road to be used as a loading track in case of another slide. This was a double end track, which provided the means of getting around the slide unless it came down to a greater extent than anticipated. In January, 1919, therefore, when another slide covered the main track and part of the loading track, this temporary track was utilized for passing trains, while the slide was cleared from the main track.

It was evident that the ordinary remedies for slides, such as piling, bulkheads or walls, would not hold or stop this movement, as it all came from above and would have covered such structures in a short time. The top of a hard layer of blue clay, soapy and impervious to water, extended six to ten feet above the new grade. The entire formation above the blue clay was a sandy yellow clay with about 30 per cent of boulders and loose rock. This formation was very porous and the water ran down through it to the blue clay formation and then along the top of this to the face of the cut. The top formation was loosened in this manner and in wet weather simply slipped over the blue clay.

In May, 1919, a break was discovered about 500 ft. up the side of the mountain and the entire section below



An Average Section Through the Hillside

it seemed to be moving towards the track. It was then determined to attempt a remedy by drilling through these upper formations to the solid rock and breaking up the various strata by explosives so that the water would pass through them rather than flow toward the face of the cut. A four-inch "Cyclone" gasoline drill was installed and holes drilled about 75 ft. back of the top of the slope of cut and 75 ft. apart. A total of 11 holes were drilled, ranging from 95 ft. to about 130 ft. deep. These holes were from 110 to 190 ft. from the center line of the main track. They were drilled from 8 to 10 ft. into the soapstone formation which surmounted the solid rock 20 to 25 ft. below grade. It was necessary to case the top part of each hole in the sandy clay and boulders. As soon as a hole was drilled it was sprung and immediately loaded and shot. About 100 lb. of dynamite was placed in the bottom or rock shot and about 75 lb. in the upper or blue clay shot, the latter being placed at about the height of the grade. Between the lower and upper shots the holes were filled with sand. The holes necessitated their shooting quickly after cleaning as water ran in very rapidly. In each case the casing was pulled after the hole was loaded and everything made ready for shooting.

There was no distortion of the face of the cut or the ground around the hole as a result of the shooting and the surface dried up immediately. Since the completion of these holes two years ago the cut has held up in good shape and has never blocked the track. As the front slope is now becoming well covered with vegetation no further trouble of a serious nature is anticipated. The total length of holes drilled was about 1,232 lin. ft. The total cost of drilling and shooting the holes was $1,816.92, which represents a cost of approximately $1.47 per lin. ft. of hole. The entire work of drilling and blasting was started late in May, 1919, and finished early in July.

Some Safety Rules for Maintenance Men*

BY T. R. MCCAMPBELL
Supervising Safety Agent, C., C., C. & St. L., Indianapolis, Ind.

THE BEST WAY to correct the defects is through a proper organization for safety within the maintenance of way department, and the appointment of responsible men in charge of the construction, renewal and maintenance of roadway, tracks, bridges, buildings, water supply, track scales, signals and all other structures and appliances.

A greater number of safety rules fall to the lot of the maintenance of way employees than to any other department, and in order to correct defects and prevent accidents, employees of this department should be carefully trained as follows:

Observe passing trains closely, and if anything dangerous is noted, call the attention of the trainman to the same by word of mouth or proper signal. In cases of impassable or obstructed tracks, flagging is the first duty. Work that will interfere with the safe passage of trains should not be undertaken during fogs or blinding storms, except in cases of emergency. When necessary to throw switches for loaded push cars or other reason, it should be done by the foreman.

Too many injuries happen to maintenance of way employees, due to their standing too close to passing trains and being struck by objects falling from trains, such as car doors, coal, stone and timbers, also coal from overloaded engine tenders.

Note that enginemen give proper warning sound with whistle and that the bell is rung when approaching highway crossings; report violations of this rule, and when working in the vicinity of highway crossings, protect travelers on the highway from approaching trains. Special attention should be given to the maintenance of road crossings, with respect to the safe and comfortable accommodation of the highway travel on the crossing and approaches; remembering always that good relations with the public are essential to the prosperity of the railroads.

See that the tools are in safe condition for work, free from burred heads and bad handles, and that wrenches are not worn to the extent to render them unsafe.

Be vigilant in the inspection of their districts, going over them at frequent intervals on foot or motor car, observing the condition of tracks, frogs, switches, roadway, drainage, right of way, station grounds, driveways, crossings, fences, track signs, low overhead and guy wires anchored too close to live tracks. Report immediately to the proper officer by telegraph or telephone, giving the location of any overhead wire of insufficient clearance. See that bridge warnings are maintained at overhead bridges and other structures of insufficient overhead clearance.

Unless they are to be laid at once, rails should not be distributed through yards and station grounds, where trainmen and others may stumble over them. The absence of foot guards in switches, frogs and guard rails is the height of improper maintenance.

Switch rods and connecting bolts should have cotter pins in them, to make sure that points go to their proper position when switch handles are turned. A special arrangement should be made where two or more switches are so located that their targets or switch lamps might be confused, such as using switch stands of different heights or setting one stand farther from the track by using a longer connection rod.

In cutting rail a saw should be used in preference to a chisel, if time will permit, but when cutting with a chisel the man holding the chisel and the man striking should wear unbreakable goggles, and the man holding the rail should face away from the cutting. The importance of this rule cannot be overestimated, as the records of the claim department will show. Track bolts should not be broken from rail joints with a spike maul, as there is always danger of injuring some one with flying pieces. In handling rails, ties and other heavy materials, special care should be taken to avoid injury to persons.

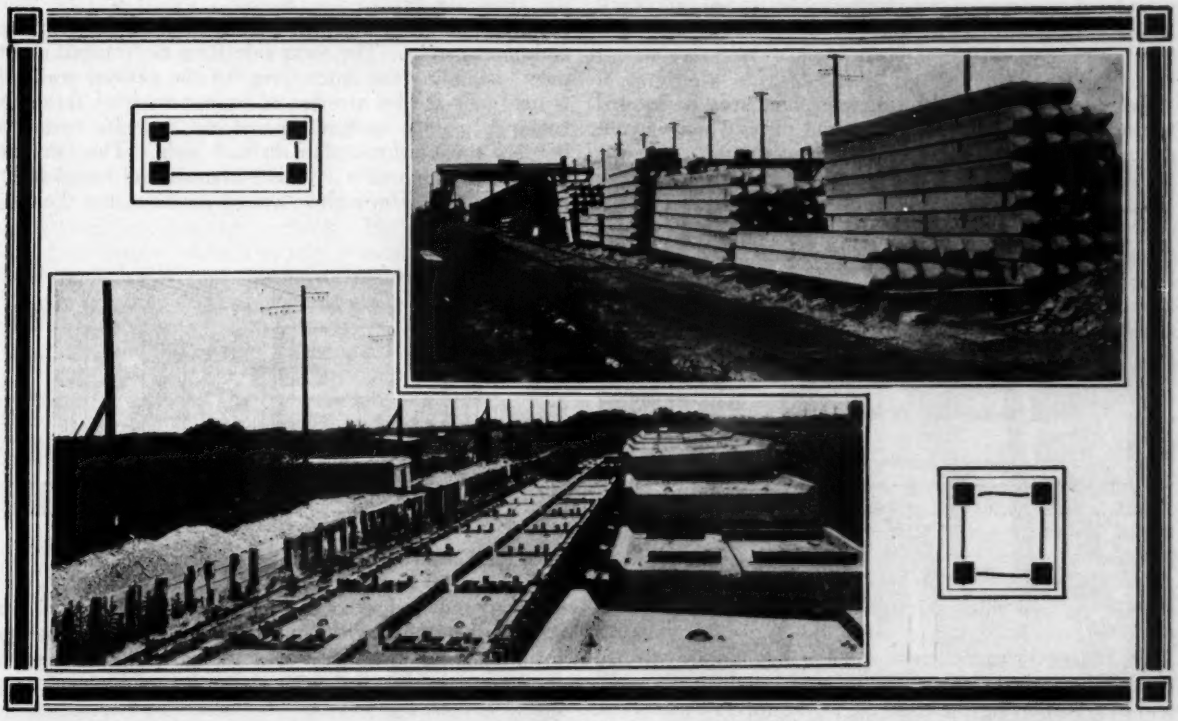
Watchmen, patrolmen, track walkers and others, whose duties make it necessary for them to walk on the track, where there are two or more tracks, should, when at all practicable, walk against the current of traffic, keeping a lookout in both directions for approaching trains. When working on tracks in places where approaching trains cannot readily be seen because of obstructions such as buildings, curves or cars, a good precaution is to assign one man to warn of the approach of trains. Foremen should educate their men to be alert and watchful to avoid danger at all times. When large numbers of inexperienced men are working on the track, they should be divided into squads, each squad being placed in charge of an experienced man. Holes dug near the track should, when practicable, be covered before dark.

The responsibility of supervisors of bridges and buildings cannot be passed over lightly from a safety standpoint. It is up to this class of officers to see that proper clearance is maintained between tracks and bridges, trestles, culverts, docks, wharves, buildings, sheds, platforms, stock pens, stock drenchers, right of way fences, lighting plants, engine houses, coaling stations, turn-tables, etc. Where for any reason proper clearance between buildings or other structures cannot be had caution signs should be placed where the trainmen's attention will be called to the insufficient clearance before entering such tracks.

Rigging, staging and scaffolding should be put up carefully and it should be known that they are safe before using. Where scaffolding is used in painting structures, on or near tracks, care should be taken to keep ropes and rigging from coming within clearance lines required for train operation. Ladders on signal and interlocking masts must be securely fastened to masts, bridges and suitable foundations.

All classes of maintenance of way employees that use camp cars for sleeping purposes should see that such cars are equipped with portable derails and that derails are properly placed when men are occupying these cars.

*Abstracted from a paper presented before the Tenth Annual Congress of the National Safety Council, at Boston, on September 26-30, 1921.



A View at the Slab Plant *Piling Ready for Shipment*

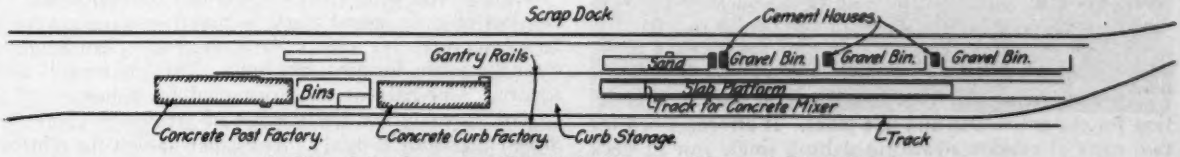
A Modern Concrete Slab and Pile Plant

How the Burlington Builds the Unit Members for Concrete Trestles at Four Central Points

IN THE *Railway Maintenance Engineer* for May, page 205, appeared a detailed account of the manner in which reinforced concrete pile trestles were built by the bridge gangs of the Chicago, Burlington & Quincy. This article contained only a minor reference to the manufacture of the piles and slabs themselves on the ground, as this is essentially a separate matter. Some roads buy these units of the structure from a contractor or manufacturer who specializes in their fabrication and even on those roads which make the slabs for their own use this portion of the work is often handled by an independent organization. However, it is believed that an account of one of the four interesting concrete plants operated by the Burlington to supply the precast units for its concrete trestles will hold much of value to the railway engineer and also serve to complete the record of concrete trestle building on this road.

Plant processes are subject to a gradual development. Consequently, the later plants set up embody improvements and refinements that were not appreciated or realized when the first one was constructed, but which came to mind nevertheless as a consequence of experience with the earlier installations. For this reason it was concluded that the last plant built, that at Havelock, Neb., would offer the best field for a study of this kind. Havelock is the site of one of the Burlington's large system repair shops and the concrete plant is operated in connection with certain other manufacturing operations under the direction of the division storekeeper. In addition to the concrete slabs and piles, the concrete plant is equipped to manufacture concrete fence posts, platform curbs, hog troughs and some miscellaneous items. The fence post factory was described by W. W. Eldridge in an article appearing in the Maintenance of Way Section of the Railway Age Gazette of March 17, 1916, page 498.

The concrete plant is located adjacent to the scrap dock, but is arranged in such a way as to be essentially an independent, self-contained unit. It occupies a strip of land 75 ft. wide by 1,100 ft. long, all of which is served by a gantry crane and a side track with opportunity for considerable extension of the plant in either direction. An examination of the small map will show that the gantry crane serves the area completely, so that concrete materials may be unloaded from cars to storage and the

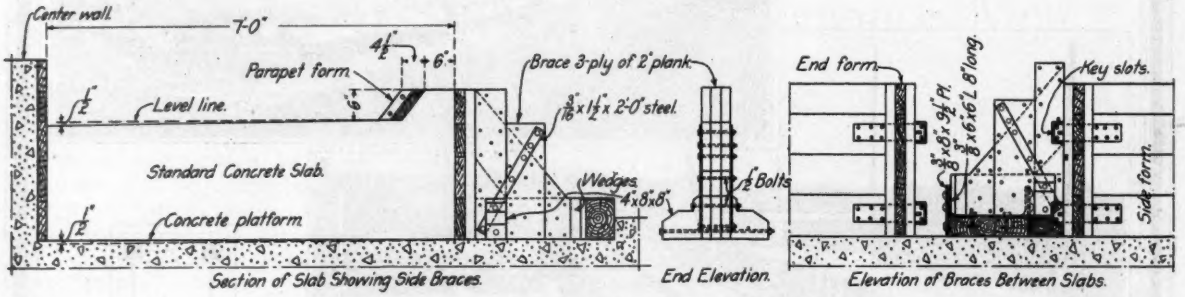


A Plan of the Layout at Havelock, Showing Bins and Crane Track

completed products of the plant may be loaded onto cars, all with the help of the crane.

THE SLAB AND PILE PLANT

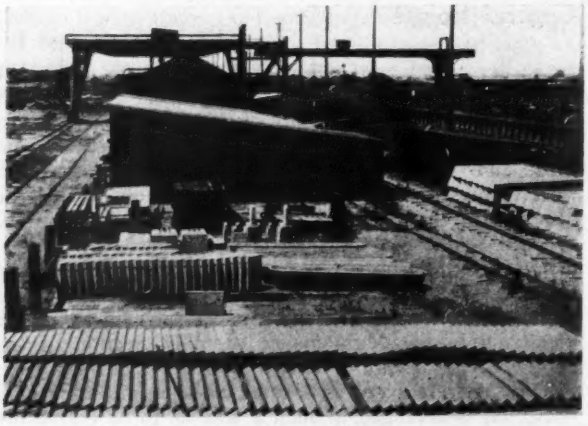
Fully two-thirds of the concrete plant area is devoted to the making of concrete slabs and piles, which is conducted in the open so as to afford a maximum use of the gantry crane. The arrangement is longitudinal. The slabs and pile forms occupy a central strip with material



A Sketch of the Forms in Which the Slabs Are Made

storage on one side and completed product storage on the other.

The plant is particularly noteworthy because of two distinctive features: First, the manner in which the problem of transporting the concrete to the forms was solved, and, second, the special construction provided to insure perfect alinement of the forms. Instead of providing some trucking or conveying system for carrying the concrete from the mixer to the forms, the entire mixer plant has been placed on wheels so that the plant itself may be set directly over the point for depositing the concrete. In



Stock of Concrete Curb Units

the case of the forms, absolute security for the formwork has been obtained by building a concrete platform which serves as a bottom face for the forms and also the anchorage to which the side forms of the slabs and the gang forms for the piles are positively secured in place.

This concreting platform comprises the axis or foundation for the entire slab and pile plant. It affords a bed for two rows of reinforced trestle slabs, a single row of deck girder slabs and the gang forms for the piles, while a curb along each side carries the rails on which the concrete plant is rolled. On the portion of the concrete platform devoted to the concreting of the trestle slabs, there is a further elaboration in the form of a central concrete diaphragm or wall against which the other side forms for the slabs are braced and plumbed. This will be more readily understood after an examination of the drawings and photographs. The outer side form is arranged in one piece, including the inner form for the parapet wall. It is held in place by a series of braces made of three-ply, two-inch planks, wedged against the concrete curb that borders the platform slab on each side. The two end forms are anchored in a similar manner and keyed to the outside form. The withdrawal of the keys and the loosening of the wedges releases the form quickly and permits the loosening of the outside form so that the parapet form is slipped over the top of the parapet. The central diaphragm is sheathed with timber to avoid bonding of the new concrete to the old and all of the forms are sheathed with galvanized iron. The form surface exposed to the concrete is treated with a coating of crude oil previous to each use of the forms.

The side wall forms and end forms are constructed and spotted on the platform for the construction of slabs 16 ft. long. In case it is desired to make shorter slabs false bulkheads are introduced at the requisite distance inside the regular end forms. The drain holes called for in the slabs are constructed by inserting pipes of proper size made out of galvanized sheet metal and these remain in the slabs after they are finished, experience having shown that it is cheaper to do this than to attempt the use of a mandrel with the idea of removing it after the concrete has been set. The reinforcing bars used in the slabs and piles are purchased from the mills in standard lengths and are cut to the lengths and bent as required at the store department shop at Aurora, Ill., and then shipped to Havelock and the other concrete plants, so that no bars need be cut at the concrete plant except under special conditions. The reinforcement for the slabs is assembled in the forms, piece by piece, and wired together. It is held at the requisite distance from the bottom of the slabs by metal chairs purchased for this purpose.

In the case of the piles wooden gang forms are set up on the concrete platforms and the completed "cages" of reinforcement are set into each unit of the form.

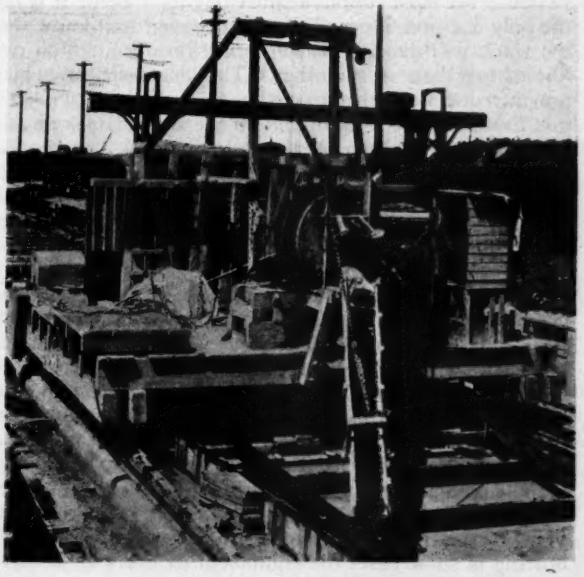
A CONCRETE PLANT ON WHEELS

The concrete plant is a complete self-contained unit. It consists of a six-wheel truck mounted on rails spaced 22 ft. center to center with a platform at sufficient height to clear the forms for any slabs built. This platform is 24 ft. square. One-half of it is occupied by a hopper of 22 cu. yd. capacity for the storage of gravel (a single premixed aggregate is used). The other half of the platform holds the mixer with considerable space to spare for working room. The cement is delivered to the platform on a skip that holds about 250 sacks, and this, of course, takes up a considerable portion of the available space. The gravel in the storage bin is replenished by the gantry crane at sufficiently frequent intervals to avoid any inter-

ruption to the work. The mixer is a Ransom-size 21, equipped with an elevating charger arranged to descend into a shallow pit in the car platform for the purpose of receiving the charge of aggregate by direct spouting from the bin, the cement being dumped into it by hand. On the discharge side of the mixer a spout is provided of sufficient length to swing the full width of the form.

The plant is motor operated. One motor runs the mixer and another is geared to one pair of the wheels for moving the car along the track. The current is delivered to the mixer car by a section of cable that is plugged into receptacles located conveniently along the length of the runway. The same arrangement applies to the delivery of the water supply to the mixer.

The crew for the mixing of the concrete slabs consists of two men charging the mixer, one operator, one finisher and two men working the concrete into the forms. The duties of the last two include the handling of the spout and the care of the hose and electrical conductor at such times as the mixer car is in motion. It is estimated that about one-third of the craneman's time is occupied in



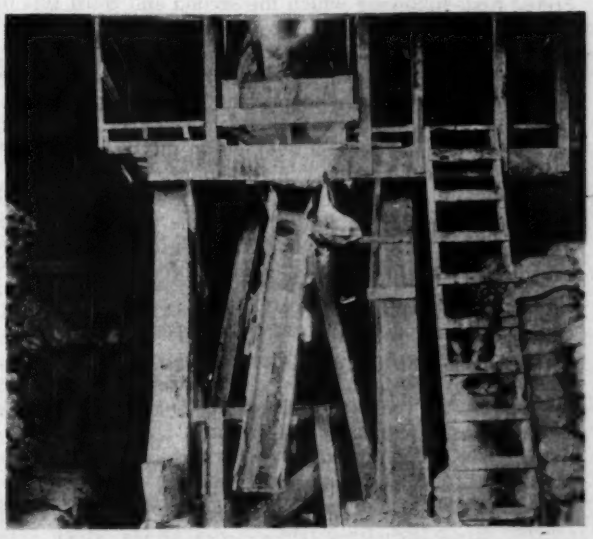
The Slab Plant Is on Wheels

tending the mixer car while it is in operation. This crew of six men will build eight 16-ft. slabs in eight hours or 36 piles 16 to 24 ft. long or 26 to 30 piles when 24 to 32 ft. long. Each unit constructed is marked with the date and length as soon as completed.

THE CURB AND TROUGH PLANT

The curb and trough plant is housed in a frame building covering an area about 30 ft. by 140 ft., by far the larger part of which consists of a low shed for the storing and curing of the concrete, the remaining portion consisting of a somewhat higher structure comprising the concrete plant and the storage space for the concrete materials. The building is equipped with steam radiators for heating in winter time.

The concreting plant consists of two hopper bottom bins providing storage for sand and gravel, respectively. There is also ample space to take care of a large supply of cement in sacks. The mixer, a one-half yard Ransom machine, is mounted on a high platform adjacent to the two material hoppers from which the sand and gravel may be spouted into the hopper of an elevating charger, into which the cement is also readily dumped. A spout affords means for discharging the concrete into the forms. The two aggregate bins are filled by the gantry crane through scuttles in the roof while the cement is delivered in cars on a track alongside the building. Although the storage space provides for both fine and mixed aggregate,



The Concreting Arrangement in the Curb Plant

they are not used together. The gravel is used alone for the manufacture of the platform curb units while the sand is used exclusively in the hog troughs, which have thin walls and therefore preclude the use of large particles in the aggregate.

The photograph of the curing room shows that the trough and curb forms are mounted on trucks standing on 26-in. gage tracks, of which there are four lines running parallel with the length of the building. Under the plan of operation followed, the forms, whether emptied or filled, remain on the trucks until the curing is completed and the units are unloaded out in the storage yard. In

The Curb and Trough Plant

the casting of the hog troughs only a single unit can occupy a car, but the curb sections are made and loaded in three tiers of three units each. For the purpose of concreting and for securing suitable connection between the four tracks a transfer table was provided, this table being

located transversely of the building directly under the discharge end of the concrete delivery spout. In operation, the car with the form is moved onto the transfer table, then shifted transversely directly under the spout, filled with concrete and then transferred to any track desired. With the curb units, one tier of three units is concreted first, following which the second and third sets of forms are lifted on top of those previously cast and concreted in turn.

This plant requires the services of four men, one at the mixer, one charging the hopper and two working the concrete into the forms as well as doing whatever finishing is required. This crew will average 65 pieces of platform curb in a working day of eight hours.

The annual output of concrete products at the Havelock concrete plant may be judged from the following figures for the years 1918, 1919 and 1920. These tables also give an idea of the sizes of the various products which are most commonly used:

REINFORCED CONCRETE TRESTLE SLABS

1918—31 slabs 14 ft. long, 148 slabs 16 ft. long, 24 slabs 20 ft. long.
1919—34 slabs 14 ft. long, 71 slabs 16 ft. long, 32 slabs 20 ft. long.
1920—71 slabs 14 ft. long, 182 slabs 16 ft. long, 28 slabs 20 ft. long.

NUMBER OF REINFORCED CONCRETE PILES OF EACH LENGTH IN FEET

Lengths..	12	14	16	18	20	21	22	24	25	26	28	30	32	Total lineal feet
1918....	36	9	162	65	76	6	99	65	12	99	104	33	12	16,864
1919....	24	..	233	139	155	..	128	153	..	143	31	70	..	22,792
1920....	..	..	298	159	125	..	183	116	..	60	29	147	..	23,722

MISCELLANEOUS PRODUCTS

	Concrete Curb	Hog Troughs	Cattle Troughs	Fence Posts	Gate Posts
1918.....	7,480 lin. ft.	200	64	25,571	39
1919.....	6,215 lin. ft.	142	61	25,205	579
1920.....	7,936 lin. ft.	90	59	34,556	1,311

The concrete plant at Havelock is operated under the direction of I. G. Morrison, storekeeper at Havelock, Nebr., subject to general supervision by G. A. Haggander, bridge engineer, Chicago, Ill. The plant was designed and constructed by F. T. Darrow, assistant chief engineer, Lincoln, Nebr., under the supervision of Mr. Haggander.

A STRONG CONCRETE ALSO WEARS WELL

FACTORS which give concrete a high strength will also give it high resistance to wear. This is one conclusion contained in a report made by Duff A. Abrams, professor in charge of laboratory, Lewis Institute, Chicago, before the American Society for Testing Materials at its convention in June. This conclusion is based on a study of some 7,000 wear blocks as well as several thousand compression cylinders and miscellaneous specimens that have been tested.

In general the tests showed that the factors that give concrete of a high strength produce concrete of low wear. Increasing the quantity of cement decreases the wear. Increasing the quantity of mixing water causes a material increase in wear. The coarser the grading of the aggregate up to certain limits the lower the wear. One of the most significant results of the tests was to bring out the importance of curing concrete for a time in a moist condition. The quality of fine or coarse aggregate produced less effect on wear than is commonly supposed. The wear was materially reduced by increased mixing. The wear of the concrete was not sensibly increased by the use of hydrated lime or other admixtures used in the tests up to 20 per cent of the volume of cement. Wear was also found to decrease with the age of concrete.

ANCHORING TRACK AT SWITCH CONNECTIONS

BY W. F. RENCH

THE TRACKMAN has no more important duty than the proper maintenance of his switches. The safety of train movements depends upon correct adjustments being provided at the points of switches at all times. In the case of an interlocked switch, the clearances of the head tie with the No. 1 rod and the bridle rod are necessarily small and these need to be maintained with care to avoid a failure of the switch. The introduction of the switch points causes a break in the continuity of the main and turnout rails connecting with them, which makes these rails subject to the effect of rail creeping in a high degree. As the tendency of the creeping is to tighten the gage through the switch, the limit of which for continuing safety is no more than 3/16 in., the necessity for a means by which this creeping action can be resisted is obvious.

While the derangement in the adjustments of the switch is the most serious feature of the problem, it is not the only one presented. Maintenance men well know that the track will develop wider expansion openings on one line of rail than on the other. The larger spaces, which not infrequently become as wide as the bolting will permit, are generally to be found on the right hand rail. In most cases, the reason for the open joints is the presence beyond them of a turnout which is insufficiently held against creeping. The fact that trailing turnouts predominate in the physical characteristics of most roads accounts for the condition being more often observable on the right hand rail.

The protection of switches against the effect of rail creeping concerns, therefore, not only the connection itself, but applies also to the track for a considerable distance back of the switch. The extending practice of bolting the joints at the heel of switches to the main and turnout stock rails through heel blocks is affording good results, although a tendency of the bolts to shear off has been noticed and the need of still further anchoring has become recognized. The use of six rail anti-creepers on each line of rail on the approach to the connection and of a greater number between the frog and switch, embracing in some cases the equipment of every tie on both lines of rail connecting these two members, has been found to afford the necessary relief.

It is not a good practice to anchor the main rail alone, because a torsional action is thereby produced which tends to disturb the position of the frog, if not to cause distortion of the frog itself. In the interlocked turnout the maintenance of proper clearance with the head tie, as well as the protection of the turnout block joint, requires that equal resistance be provided on both the main and turnout rails. While the movement of the rails in main track work seldom is sufficient to cause a serious tightening of the gage at the frog, its possibility is nevertheless present and should be guarded against.

The necessity for an equipment of rail anti-creepers on the two lines of rail extending between the frog and switch in yard connections is not entirely appreciated. The first effect when the frog advances is a tightening of the track gage, usually on both tracks. As the guard rails are secured rigidly to the main rails by clamps and fillers, the guard rail gage also is tightened, which may quickly reach the point where derailment is imminent. In the more lightly constructed tracks common to yards this condition is liable to develop between the trips of the trackwalker and the need for having such points well protected against such possibilities should be recognized.

MAINTENANCE COST STATISTICS WORTH WHILE

Economies Are Possible Through Use of Simple and Accurate Records Kept for All Classes of Work

BY CHARLES WEISS

THAT individual who originated the conception that statistics are only lies under a different name had a rather warped notion regarding this important subject. It is very true that statistics have been used or abused to prove many untruths, either because they are not applicable to the subject in hand or not sufficiently extensive or because the arguments were based on false premises and used only some insignificant part of the data. This should not, however, detract from the true value of figures. The important points to determine are, (1) how extensive are the figures, (2) do they represent average conditions, and, if not, have peculiar or local conditions been explained and allowed for, and (3) was the data taken by capable and trustworthy parties? The situation is really analagous to the application of most empirical formulae. If used blindly very erroneous results may be obtained, but it is essential to interpret properly all constant and peculiar conditions.

With the above thoughts in view it is desired to show what a valuable by-product and how great an investment for the future of an engineer or supervisor, carefully compiled records are. The engineer is a busy man and has but little time for such additional duties as compiling records. It is nevertheless to his very great advantage to maintain careful records of work done under his direction, and he can get the essential facts without the loss of much time. In fact, it will be seen that much of what is hereafter referred to can be done by some subordinate clerk or rodman. After a proper start and with occasional criticism or correction, such work will run on almost automatically. At the outset, the following requirements should be fulfilled: simplicity of compilation, ease of representation and, more important still, ease of understanding.

CLOSER ESTIMATE WILL BE REQUIRED IN THE FUTURE

Very few maintenance men pay much attention to this subject as may be surmised from the different estimates two men will often give for the same piece of work. They may both be capable technical men, but, having kept no records, they can only guess at probabilities. Intelligent planning of work and the preparation of budgets, estimates and seasonal or annual programs is very dependent upon the accumulation of figures from work that has been done in the past. To compute the force required on a division during a year, it is not only necessary to know what material will be needed, but also what the capacity of one man is in applying different classes of this material. We must know how many ties one man can install in an eight-hour day, how many yards of ballast he can clean and similar information. In figuring the cost of a proposed piece of new work it is necessary to know the cost of such items as laying a ton or foot of new rail, installing switches, unloading ties, etc. Average conditions should, of course, be aimed at.

These same data are the most reliable basis for determining how long it will take to complete the same piece of work. Unless a contractor has such knowledge he will be sadly underbid by another who has, or he will be entering the contract financially blind. The more such data he has the closer margin he can cut, and the more economical results will be assured for all parties concerned. Since 1914 prices and man power have been such uncertain, volatile quantities and have been changing so rapidly that the accumulation of data have been of very slight practical value. Past performance was indeed a poor criterion for future guidance. Furthermore, cost was of secondary importance to the matter of getting the job done. Money was plentiful, but men were scarce. These unusual conditions have now largely disappeared, and we have already reached a degree of stability that warrants the practice of rigid economy, one vital feature of which calls for accurate records. Prices of materials and wage scales will undoubtedly undergo further readjustment, but the performance of labor has in many instances already reached pre-war standards. No arguments need be presented here to prove that competition in the future will be much keener than it has been for a long time. Axiomatic as that statement is, it further emphasizes the importance of being able to compute our requirements closely.

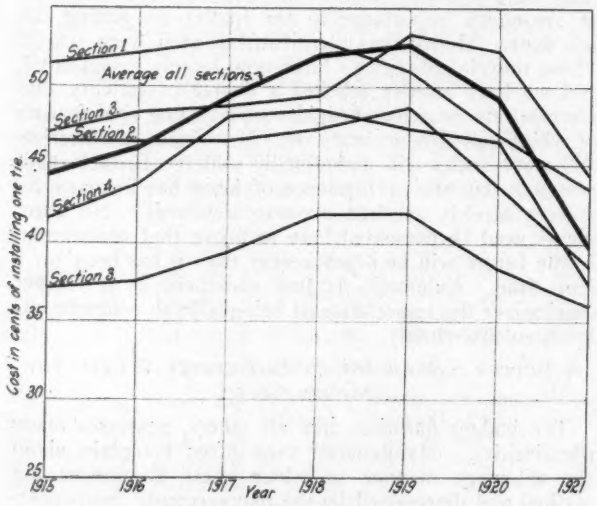
A BUDGET SYSTEM INDICATES EXACTLY WHERE THE MONEY GOES

The budget question, like all others, possesses many peculiarities. Maintenance men often complain about the arbitrary manner in which their allowances are slashed and determined by the management. Such practice is indeed very common and fundamentally wrong. It is unscientific and causes serious disruptions of well-laid plans. But it is not entirely one sided. Maintenance men overlook or ignore the fact that their own estimates are very often merely guesses. They have kept such meager data that their figures are based upon more or less vague recollections of offhand observations. Higher officers, often from their own early experiences, know this to be the case, and can therefore hardly be blamed for not placing implicit confidence in the estimates they receive, preferring rather to be guided by their own judgment as influenced by larger questions unknown to subordinates.

Critics will argue that budgets and records such as are referred to herein represent a waste of time. Their strong point is that only a certain number of men will be allowed, and that merely keeping a record of where the money goes to will not hold any of it back. After the vast amount of discussion that has recently filled the newspaper and magazine columns on the subject of the national budget, it seems useless to discuss the subject with such unwary ones. If they are unaware of the economies that have been effected in state and municipal governments after the introduction of budgets, a little study of the subject might prove very illuminating to them. A talk with any housewife who keeps a record of her household expenses will also prove convincing, for the identical principle is involved in all the instances cited. The housewife will tell him that before keeping records she did not realize where the money went to, but after doing so she was startled at the enormity of some supposedly insignificant items. A slight study of them showed her where she could effect considerable savings. This situation is analagous to an entire railroad system as well as to an individual foreman's section of the same. One method

of eliminating waste, the greatest handicap to our industrial efficiency, is to keep records and study them.

In railroad as well as in most other kinds of work, such information presents an excellent basis for comparing work done in different localities and with different men, methods, tools, etc. Allowing for unusual conditions, it is an accurate yardstick with which to measure efficiency of single individuals, gangs and foremen or of even larger units. Quality of performance must not be overlooked in this study of quantity, for it is just as important. Extensive records make it possible to locate the laggards and either to spur them on to greater effort or to remove them from the organization. They also indicate where the best and also the poorest methods are probably being



The Cost of Installing Ties on Sections

used, further study of which may reveal valuable information. They show us where the machine should be lubricated and friction eliminated.

The offhand objection to this question of records is that it involves too much bookkeeping. There is undoubtedly the possibility of going into too much detail, but the fundamental facts can be ascertained without much detailed labor, as previously stated, principally with the aid of some low-paid subordinate.

LITTLE LABOR REQUIRED TO MAINTAIN COST RECORDS

On practically all railroads, as well as on engineering projects in general, the foreman or a timekeeper, shows either in a time book or on time sheets all the information that is the basis for maintenance or construction cost-keeping. This record must show the number of men working and the hours made by each with corresponding totals, in order that payrolls may be prepared properly. In addition, notation is usually made of what was accomplished, as, for example, raising 16 rail lengths of track, 4 in., 88 hr.; leveling ballast, 24 hr.; total, 112 hr. On separate forms the foreman also accounts for material used and reclaimed or salvaged. A brief account like the above takes very little effort on the part of the foreman and is very essential for efficient progress, for it makes him realize that his work can then be watched accurately and compared with that of other gangs. Unless he supplies this information he has very little incentive for getting the utmost work out of his men, and will probably try to get by with the minimum of effort. Assuming, therefore, that the time sheets or books furnish a quantitative description of what was done for the time worked, it only remains to combine the figures. Up to this point not one minute's extra labor has been required, and the remainder is a simple clerical matter, which also involves but very little time or expense. Usually a clerk or timekeeper or a rodman is available who rarely has enough work to keep him busy. However, even if such a man is not available, the data compiled will be referred to so often for other reports that the time saved there will compensate for the extra expense involved in working up the figures.

A card index or loose-leaf system is about the simplest. Taking the matter up in detail: each gang will have a similar set of cards for it, each card being devoted to one of the most common operations. Thus Foreman John Jones has a card for installing ties, one for raising track, one for leveling ballast, etc. It may be arranged as indicated:

SECTION 9. FOREMAN, JOHN JONES. MIDDLETOWN

					Ties	
Date	Hrs. Labor	No. Installed	Remarks	Total Cost	Cost Per Tie	No. Per Man
4-6-21	80	96	Main Track	$32.00	33c	9.6

At some regular period, as at the end of the month, all the figures on the page are totalled and averaged. They can then be transferred to a similar page in a more permanent book, which is devoted to the same item for the entire division, excepting that in this particular case, one page would be devoted to main track, one to siding and another to yard ties. There each foreman's efficiency can be noted at a glance, and the final average for the year will give a very reliable figure to use for future estimates. For items that do not appear very often, as for installing switches, separate cards are not required for each foreman, but a single page is used for it in the book. A column should be included, however, wherein the foreman's name can be entered. The actual daily routine should be somewhat as follows: The time sheets are first assembled in the order that they appear on the payrolls, which is the same order used for the cards. The sheets are then taken in rotation and the amounts transferred to the corresponding cards. The total operation for a force of several hundred men should not take more than 15 min. daily, as the mathematical calculations can be made with a slide rule.

SOME OF THE IMPORTANT ITEMS WHICH THE RECORDS SHOULD COVER

The following items, at least, should be kept track of, and as many more as desired:

Cost of laying rail per ton or per foot for various weights of rail in main and other tracks.
Cost of installing ties in main and other tracks.
Cost of raising one foot of track various heights in different kinds of ballast.
Cost of cleaning track per foot or yard.
Cost of installing switches, cross-overs and crossings of various kinds.
Cost of applying tie plates, rail anchors, braces, clamps, splices, bolts, etc.
Cost of leveling various kinds of ballast.
Cost of loading and unloading ties, ballast and other material.
Cost of gaging, lining and spot-surfacing track per foot.
Cost of tamping ties.
Cost of tightening and oiling bolts, per mile, per year.
Cost of policing tracks and right of way per mile per year.
Cost of various incidental items, such as masonry work, repairing crossings, etc.
Cost of work train service, per hour and for various kinds of work.

Extensive tests of various devices and methods are in constant progress on most railroads to determine their economy or efficiency. Very often, however, there is no substantial basis for comparison with other similar materials or means. Furthermore, we are rarely in a posi-

tion to give comparative figures accurately, and when we realize how necessary such information is for future progress and guidance, the value of collecting data similar to that suggested by the following, will also be very apparent:

Relative cost of maintaining track in cinder, stone, slag and gravel ballast.
Relative cost of maintaining freight and passenger tracks.
Relative cost of maintaining tracks on straight lines and curves.
Relative cost of tamping ties by hand and with automatic tampers.
Relative cost of cleaning ballast by hand and by machine.
Relative cost of ditching by hand, steam shovel, narrow gage cars, etc.
Relative cost of maintaining earth, masonry and sodded slopes and ditches.
Relative cost of maintaining and erecting wire, wooden and concrete right of way fences, snow and inter-track fences.
Relative cost of maintaining track with wood and steel ties.
Relative cost of maintaining various types of poles, lamp-posts, crossings, signals, culverts, pipes, switch stands and lamps, etc.
Relative cost of applying various types of splices, rail anchors, tie-plates and other fastenings, as well as cost of maintaining same.
Relative cost of unloading rail, ballast and other materials by different means.
Relative cost of laying rail by different methods or practices.

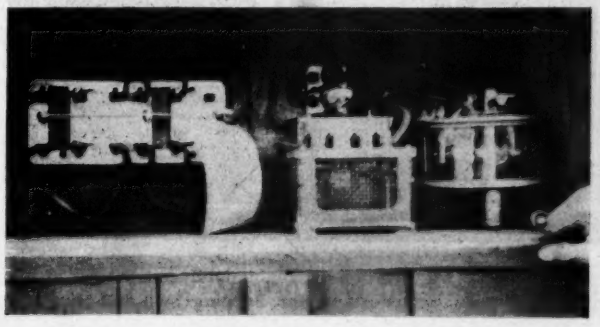
The salient features of comparative cost data can be simply shown graphically by plotting figures for each unit at regular periods, either monthly or annually. Such charts similar to that shown for ties can be made for the principal items and of pocket-note book size. A few of these tell the entire story at a glance, and in a manner that can be very much appreciated by higher officers. Similar charts can be worked up to show what is being accomplished quantitatively, that is, the number of ties installed, the amount of track raised, and so on.

The mass of information referred to here can be obtained with very little expenditure of time. It shows not only actual costs and comparative costs, but indicates the capacity of men in different lines of work. By training the foremen, still other equally useful information is secured, such as the average life of ties, rail, ballast and other material, the frequency with which ballast should be cleaned, and above all, the annual requirements. The latter very important consideration is at present usually a guess, based upon previous guesses. These guesses often require as much labor as getting the facts, and they would all be eliminated with the introduction of some such simple system as the one outlined above.

Using Signal Lines for Maintenance Purposes

BY L. F. VIEILLARD,
Electrical Inspector, Long Island Railroad, Jamaica, New York

IN THE PAST the lines of distribution for an alternating current signal system were considered fit for that service only. These lines are installed at a considerable expense both for overhead and underground construction. Lately it has been realized that there are other uses for which these lines can be used advantageously without any appreciable interference with the operation of the signal system, such as low power factor, fluctuations in voltage, etc. The voltage of the transmission line is usually above 2,200 volts, many times running as high at 11,000 volts' pressure. This means a small amount of primary current; therefore the primary load will be small and the primary voltage drop will be small likewise.



A Vibrating Rectifier for Charging Storage Batteries

On the system with which the writer is connected the question of lighting switch targets has been given considerable attention, particularly in yards where there are a great many targets located close together. These targets have been equipped with either 110 or 14 volt, 5 watt lamps. Everyone is familiar with the shortcomings of oil-burning lamps, such as failure due to high winds, poor oil, smoking chimneys, etc. Probably the most important improvement in the electrically lighted switch target is that of increased range and spread. By using a carbon filament lamp increased life of the lamp is assured. This is made necessary because of the vibration of the timbers supporting the target, the carbon filament being more rugged than tungsten or other improved metal.

It has been considered good practice to locate the transformer energizing the target lamps centrally if possible so as to avoid an unnecessary drop in voltage at the limits of the installation. The primary transformer is usually located on a concrete pole under the transmission line, if it is aerial, and the secondary leads run to a terminal or junction box, where it can be branched off to the various light locations. If it is decided to use 10 or 12 volts instead of 110 volts across the lamp, it is then necessary to install a secondary transformer, which can be located in the junction box. The installation of electrically-lighted switch targets on the writer's system has been left to the signal department forces, as they have the necessary tools and accessories, such as fuses, terminals, wire and trunking, etc.

For a great many years some of the stations and station platforms on the system with which the writer is connected have been illuminated from energy supplied by the signal transmission lines. This is a very economical method of station lighting, as the current generated costs but two cents per kilowatt hour, whereas if it were purchased from commercial sources the cost would probably run up to nine cents per kilowatt hour. The transformers can usually be located conveniently so that the control of the lighting circuits can be either in the hands of the station agent or of some predetermined train crew, who will turn off the current at some specified time. This arrangement of lighting can also be applied to locations where there are underground subways passing from one track to another.

In station and platform lighting it is advantageous to use commercial transformers and not go to the expense of using signal transformers, as they usually have various secondary taps not particularly suited to this type of installation. Transformers should be protected by the necessary fuse plugs, choke coils and lightning arresters.

Where signal transmission lines run through territory served by large stations, use can be made of these lines to operate baggage elevators and to charge storage batteries used in electrically-driven baggage trucks. This can also be said of charging batteries for automobiles around motive power shops where they are used to haul material from place to place.

Again, too, on electrified lines where signal transformer locations are close together, say 1,000 ft. apart, use can be made of the power lines to operate drilling machines for rail drilling where heavy traction bonds are used or motor-driven grinders can be used to grind off burrs on switch points or grind off the head of the rail for gas or arc-weld bonding. The current used by each instrument is so small that it permits of long cables being used so that no track location is out of reach of these instruments. Present day practice in signaling is to locate secondary transformers in housings mounted on foundations level with the top of the rail, so that it is comparatively easy to make arrangement for additional sockets in these cases to plug into for the operation of drilling machines, grinders, etc.

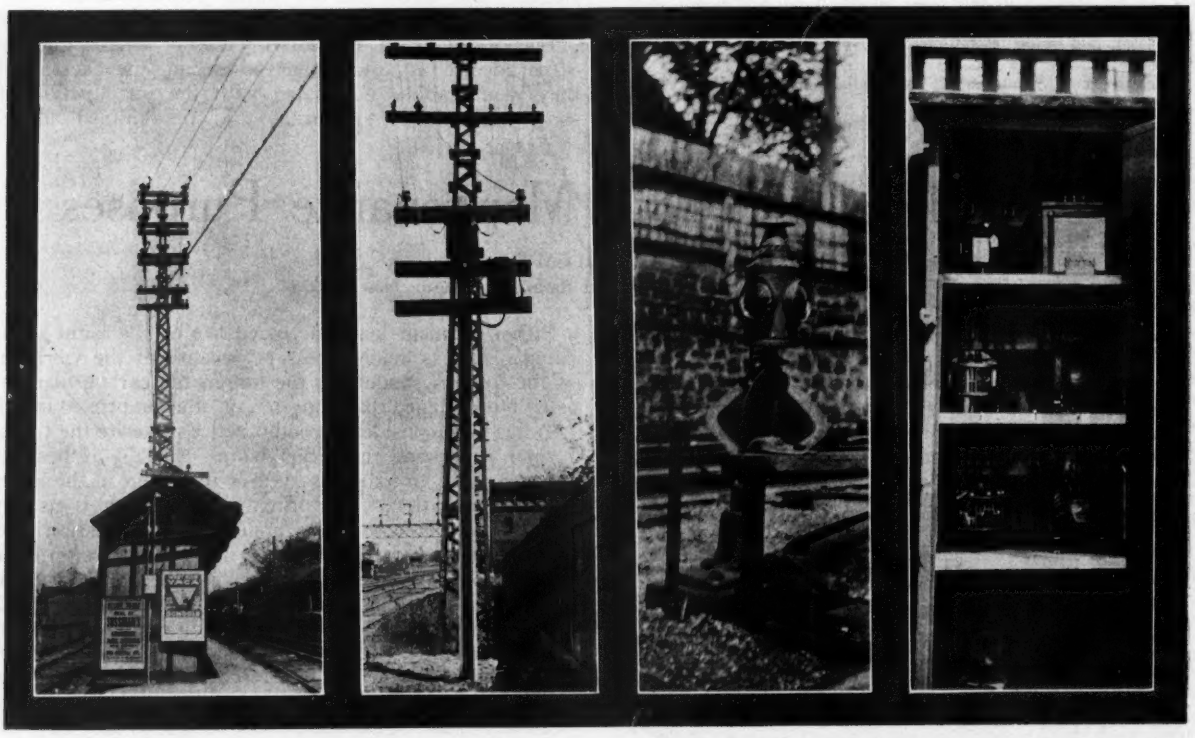
The question of operating motor-driven crossing gates can be easily solved by making use of signal transmission lines. A great many times it is advantageous to operate several crossings from one location, in which case the distances are too great to do it mechanically, so recourse must be made to power-operated units. Under this heading can also be mentioned the operation of swinging and rolling lift drawbridges, particularly in places where the river traffic is dense, such as near summer resorts.

The writer can conceive of, if it has not already been designed, a motor-driven air compressor to do tie tamping, particularly in stone ballast. Everyone is familiar with the efficiency of power tie tamping, as has been demonstrated on our own railroad system in several trials.

Reverting back to the question of crossing protection, the Long Island Railroad is developing a red blinking signal to be used in connection with a crossing bell to give additional information to vehicles and pedestrians by day and night of approaching trains. The energy for this blinking light will be derived from storage batteries charged through a rectifier, the rectifier being energized from the signal transmission line. The reason for this arrangement is due to the Long Island having mixed traffic, and owing to the rare possibility of a power line failure there will be sufficient energy in the storage batteries to hold over until the power comes in again to operate the light and the crossing bell.

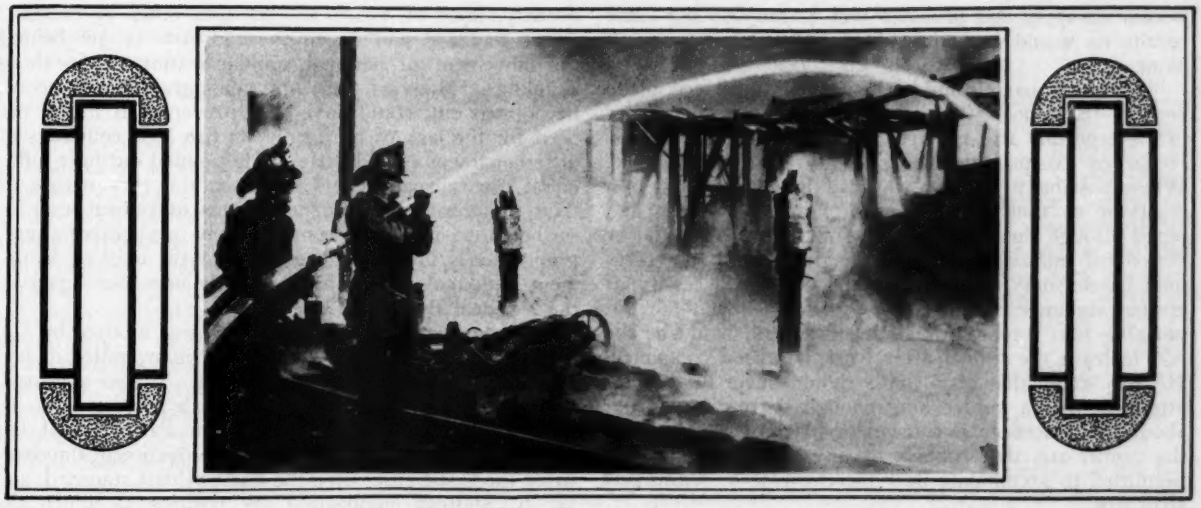
The question of welding signal bonds, instead of using the old type galvanized iron wire plugged into the rails with channel pins, is a live one at this time. Some systems are opposed to using gas-welding on running rails, claiming that this operation materially weakens the structure of rail. This obviously means the process of electric arc-welding, as this method is claimed to be considerably less harmful. This in turn means that a portable small capacity welding outfit must be designed, say to handle 75 amperes d.c. Here again we can make use of the signal mains in supplying the a.c. side of the small rotary converter to do the arc-welding.

Some signal engineers will argue against the use of their signal mains for purposes other than signaling as detrimental to the operation of the signal system, but experience has shown that on our system, where we have practically all the apparatus mentioned above, the transmission system shows a power factor of 70 per cent, notwithstanding a length of practically 200 miles of No. 2 wire. Engineers, in designing a transmission line for signaling purposes, should take into consideration the question of additional loads as mentioned above and provide a line with enough capacity electrically for the need.



Left. Line Transformer Used for Station Lighting
Right. Primary Transformers on a Concrete Pole

Left. An Electrically Lighted Switch Lamp
Right. Transformers for Feeding Switch Lamps



Fire Fighters Discuss Maintenance Problems

Tunnels, Coaling Stations, Water Lines and Similar Subjects Figure Prominently in Proceedings

THE RAILWAY Fire Protection Association is an organization consisting of about 200 men, the larger portion of whom are in responsible charge of fire prevention and insurance on American railroads. Advancing the information that approximately 8,000 fires, representing a property loss in excess of $10,000,000, occurred during 1920 on 75 railroads alone, and dedicating itself to the work of materially reducing these figures, this organization met in Chicago, October 18, in its eighth annual convention and devoted three days to the study of ways and means of accomplishing its purpose. The deliberations of the association during this period involved the consideration of many subjects ranging from the general importance of fire prevention to detailed discussions of structures, appliances and practices from a fire prevention standpoint. Among the subjects considered were many having an immediate interest to the maintenance of way department, prominent among which were discussions on tunnels, coaling stations, fire protection in railroad yards, the handling of explosives, etc.

Fire Prevention and Protection in Tunnels

On the subject of fire prevention and protection in tunnels, S. B. Howatt prepared an unusually interesting paper concerning the situation on the Southern Pacific Lines where there are 151 tunnels having a total length of 28-2/3 miles, of which 27 miles are timber lined. The latter tunnels, Mr. Howatt stated, present a problem in fire protection and prevention that is in a class by itself on account of the limited access afforded to the tunnel, the violence of the fire due to the chimney-like draft occurring in the barrel, the cracks or crevices in the barrel, which often afford a supply of air to a fire not subject to control, and the impossibility of reaching any fire occurring in the abundance of loose material placed behind the tunnel lagging where pockets and slides occur. On the Southern Pacific as Mr. Howatt pointed out in referring to the last mentioned point, wood was used for filling because it was cheap and plentiful. As a result, he pointed out, when a fire gets started in one of the tunnels in which wood was used it will work its way back into this packing and follow decayed channels in the wood in such a way as to defy all efforts of the fire fighters to reach it.

In the way of emphasizing these difficulties Mr. Howatt enumerated several instances of tunnel fires on the Southern Pacific, describing how in some instances an attempt at suffocating a fire by closing up the ends and pumping in carbon dioxide failed because of the ability of air to reach the fire through crevices inaccessible to the fire fighters and again where every attempt made to extinguish a fire failed because of the inability to reach the filling behind the tunnel lagging. According to Mr. Howatt the tunnel is also a structure where many of the instrumentalities considered so effective in other situations present themselves only as so much additional tunnel cost. The sprinkler system, he pointed out, would not be of much value, either because of the effect of the heat from locomotives as they pass through the tunnel or the effects of corrosion and vibration common in timber tunnels. With respect to fireproof paint, Mr. Howatt said that timber put in tunnels is not thoroughly seasoned and in many cases is green, that the paint will not adhere to wet timbers, that if it cracks and leave the wood exposed its usefulness is destroyed and that there never was a fireproof paint made that would resist the heat developed in a tunnel fire.

Where tunnels are at all subject to burning, Mr. Howatt pointed out that the problem is predominately one of preventing the fire from occurring and this, as he stated, is to be guarded against from three sources: outside source, wrecks and man carelessness. Singular as it is, the locomotive itself, according to Mr. Howatt, has never given rise to tunnel fires on the Southern Pacific, excepting, of course, in the case of wrecks. "To guard against fire from an outside source," Mr. Howatt said, "cut away brush, trees, grass and weeds and leave the ground clean for 100 ft. back from the entrance. It is good practice to whitewash the wooden portals and 50 ft. or more of the barrel of the tunnel. This should be done yearly; whitewash is cheap and a good fire retardant; it

is easy to apply and probably will accomplish the same results as would be expected of high priced fireproof paint.

"Two water barrels and buckets should be placed at the ends of the tunnels; also a five gallon fire extinguisher of the type that will not freeze and does not have to be recharged except after being used would be of value. Where possible to develop water it should be stored in a reservoir or tank with as much head as possible and piped through the tunnel, where sufficient hose should be stored for immediate use." Referring to the subject of man carelessness, he then pointed out the necessity of eternal vigilance on the part of watchmen and the importance that foremen of all repair gangs should be the last to leave the tunnel after work has been completed. He also stated that open lights should never be left unattended, that a ladder long enough to reach the roof should be placed in a convenient place at each end of the tunnel and that rubbish of any kind should not be permitted to accumulate near the entrance or within the structure.

In concluding his remarks Mr. Howatt pointed out the desirability of lining tunnels with concrete as rapidly as possible. On the Southern Pacific 6-1/3 miles have been concrete lined in the last 15 years, the plan by which this work is performed being one of concreting the portals and 50 ft. of the tunnel barrel of the most hazardous tunnels and of placing sections of concrete at points in tunnels where repairs are required. Referring to the latter practice, W. F. Steffens (New York Central) pointed out how valuable these sections undoubtedly would be in preventing fires from traveling very far through the loose material behind the timber tunnel lagging.

THE WATER SUPPLY AT TERMINALS

Water supply protection for railway terminals and yards was the subject of a report by the Committee on Fire Prevention and Protection of Shop Plants, of which J. R. Peters (Penna.) is chairman, and of a special discussion on recent progress in the standardization of fire hose couplings. The shop report prescribed systems of independent fire mains for the average locomotive car shop plant layout. "A loop system gridiron is the most effective method of installing water mains," it stated, "or where this is not practical a simple loop system. The advantage of both systems is in eliminating all dead ends, in obtaining water at any hydrant from both directions and in making it possible to cut out sections of the system for repairs without shutting off the water from the entire system; also the reduction of the frictional loss in loop or gridiron systems will make possible a reduction in the size of the pipe necessary of from 25 per cent to 40 per cent in diameters between 6 and 12 in.

"Under all circumstances dead ends should be avoided wherever possible. Hydrants may be of either the gate or compressed type, the latter preferred. Hose couplings should be interchangeable with the local fire department standards. Steamer connections should never be provided on hydrants when hydrants are supplied by direct pressure from a fire pump or where provision is made for city steamers or fire-boats to come directly into the system."

The report in prescribing that hose couplings should be interchangeable with the local fire department standards, elicited some controversial discussion which was considered in more detail when the subject of progress in hose coupling standardization came up for consideration. On the latter report E. R. Townsend, National Board of Fire Underwriters, addressed the assembly.

Mr. Townsend stated that there are 30 or more different sizes of screw couplings in service throughout the country, none of which will fit each other or the National standard and urged the railroads to get behind the movement of national standardization of fire hose couplings. Many of the worst conflagrations on record, he pointed out, could have been prevented if it had not been for the lack of uniformity in fire hose couplings of different towns or industries. He pointed out how influential the railroads could be, from the very nature of their organization, in furthering this movement and described how simple and comparatively inexpensive a matter it now is to standardize much of the existing equipment with tools which have recently been developed by the National Board of Underwriters.

The considerable discussion which was aroused by Mr. Townsend's talk made it evident that many railroads had already standardized their equipment. It also appeared, however, that other roads were not in a position to do so. H. Pollard stated that the Southern Pacific could not see the advisability of adopting the National standard, while the Coast cities used the Pacific Coast standard, and W. F. Steffens emphasized the position in which the railroads often find themselves by stating that the New York City standard must govern the standard used by the New York Central in that vicinity. Adapters, it was pointed out, present the very serious objection of becoming stolen or lost.

RIGHT-OF-WAY FIRES, WOODEN TRESTLES AND OTHER FIRES

During the convention J. S. Richards read a paper on locomotive spark fire hazards and their relation to right-of-way fires, wood trestle fires and others, which constituted the nucleus of a discussion ranging all the way from the degree of responsibility of locomotives for right-of-way fires to the fire-resisting qualities of creosoted timber in bridges. In his paper Mr. Richards contended that the popular conception that 90 per cent of fires are chargeable to locomotives is a mistaken one, a great many of the fires, he stated, being properly attributable to the carelessness of passengers in throwing cigarette stubs and cigars out of the coaches, the carelessness of bridge gangs and trespassers in leaving inflammable refuse around bridges, the carelessness of train men in dumping ashes from cabooses or handling journal packing from hot boxes, together with the frequent lack of vigilance on the part of section hands or other company forces passing over the tracks.

Reference made by one of the members at this time to the creosoted bridge on the N. C. & St. L., which, as described in the September issue of the *Railway Maintenance Engineer,* recently survived a severe fire, developed the fact that the incident has become a subject of considerable interest with many members of the association. W. F. Steffens (N. Y. C.) emphasized the important bearing which this incident might have on bridge construction and stated that the subject was now being investigated in the company's laboratory. F. H. Elmore (Hutchinson & Rivinus Company, Philadelphia) called attention to a demonstration made in the yards of the Illinois Central some time ago when a creosoted pile appeared to offer as much resistance to the test fire as a corresponding piece of timber to which fire resistant paint had been applied, although, as he pointed out, neither specimen showed itself immune to fire, and W. F. Hickey (N. Y. N. H. & H.) stated that according to investigations made by Dr. Von Schrenk that during the first six months after treatment the inflammability of creosoted timber increases over that of untreated wood but becomes less inflammable following the first six months' period. S. B. Howatt (S. P.) corroborated the statement of Mr. Hickey that creosoted timber be-

comes more fire resistant as it grows older. but stated that creosoted trestles had actually burned to the ground on the Southern Pacific.

FIRE PREVENTION AND PROTECTION IN COALING STATIONS

Fire prevention and protection in coaling stations was the subject of a report of one of the committees of the association. This report was in the nature of a revision of the 1915 specifications and was made with a view to its incorporation along with other reports in a railway fire prevention handbook. This report favored electrical machinery for all coaling station plants wherever electric power is available but called attention to many potential dangers in electrical installations and prescribed instructions to cover the care and maintenance of the structures. The report also recommends reinforced construction and installation of dry pipe sprinklers wherever water pressure is available.

Open head sprinklers or perforated pipe systems are not recommended, the report states, as they cause a severe drain on water supply, reduce the effectiveness of fire streams, are dependent upon the manual operation of valves and distribute water at unneccessary points. Wooden coaling stations erected over tracks should be protected above the tracks from heat and sparks from engines. Bins should be thoroughly cleaned at least once a month and particular care taken to remove the fine coal dust accumulations which pack in corners. The installation of steam coils in a frame coaling station to prevent freezing of coal materially increases the fire hazard and should not be permitted unless imperative from an operating standpoint. If steam coils are provided they should be installed so that they can be examined readily. Woodwork near heating arrangements for sand drying should be covered with metal, allowing one inch of air space. Open tortches should be prohibited. These were prominent among the recommendations made in the report.

In discussing this report, W. F. Steffens (N. Y. C.) cautioned against the use of concrete to protect timber coaling stations immediately above the exhaust of engines owing to the limited resistance which concrete offers to the abrading effect of the smoke. He also emphasized the importance of guarding against spontaneous combustion in coal pockets, a statement which was enlarged upon by Mr. Hickey's mention of the fact that on the New Haven trouble from spontaneous combustion was common whenever coal was permitted to remain in coal pockets for more than a month. Attention was also called, in the discussion, to the care that should be taken with hot ashes and of open lights in and around coaling plants. The preference given by the committee to the dry pipe sprinkler aroused some controversy, but it appeared that this recommendation met with the approval of the majority of the association.

EXPLOSIVES AND OTHER DANGEROUS ARTICLES

An especially valuable paper was presented to the convention by W. S. Topping (Bureau of Explosives) in the form of a handbook on explosives and other dangerous articles. This book describes the many different kinds of explosives and highly inflammable materials handled by railroad forces, classified with respect to their danger, and gives full instructions as to the proper way of handling them in order to prevent accidents and to meet situations where accidents have actually occurred. This report in particular cautions against the permitting of open lights or heated implements around substances of this kind, also against the use of water in an attempt to put out various kinds of fires arising from explosive or inflammable liquids. It is interesting to note that in this report creosote was not classed as a hazardous article.

ELECTION OF OFFICERS

Following the transaction of the reading and discussion of the reports and papers, the following officers were elected for the coming year: G. L. Ball (St. L.-S. F), president; E. A. Ryder (B. & M.), vice-president; and R. R. Hackett (R. R. Insurance), secretary and treasurer. B. S. Mace (B. & O.) was elected an honorary member. Vacancies were also filled on the executive committee, the personnal of which now consists of the following: R. H. Newbern (Penn.), G. R. Hurd (I. C.), Robert Scott (A. C. L.), E. B. Berry (Sou.), W. F. Hickey (N. Y. N. H. & H.), W. S. Wollner (N. W. P.) and W. S. Topping (Bureau of Explosives).

RIVALRY PRODUCES LARGE OUTPUT

ONE OF THE most remarkable examples of the results which may be secured by stimulating rivalry among the men was recently obtained in the excavation of the open caissons for the large mail building being constructed by the Chicago Union Station Company at Chicago. This work consists in digging circular wells 4 ft. in diameter through blue clay to a depth of about 55 ft. These wells were curbed with two-inch vertical lagging supported by heavy steel rings and were filled with concrete after they were excavated to the required depth.

The work on this particular job was tied up by a strike of the hoisting engineers, so the caisson diggers were told that if they could show proper results the muck would be hoisted by hand windlasses instead of power-operated nigger heads. The results were so satisfactory that the rest of the work, about 30 caissons in all, was carried through by hand, even though the engineers had long since returned to work.

This suggested the possibilities of further increase in production by introducing a spirit of competition into the work. Accordingly, cash prizes of some two hundred dollars and two gold watches were put up. First, preliminary trial heats were held, and from these the four best caisson diggers were selected for the finals. Two principal prizes, one for a speed contest covering the greatest depth which could be excavated in one day of eight hours; the second, an endurance contest for the man to reach hardpan in the least number of hours.

On the morning of the race no one was permitted to start until the eight o'clock whistle. Bets were placed as to the probable winners and the entire organization promptly took sides with the four gangs in the race. When the five o'clock whistle blew and the engineer and the superintendent measured the results with a steel tape, the closeness of the race may be seen from the following records:

Michael J. Naughton	27 ft. 10 in. in depth
Tom Caufield	27 ft. 9 in. in depth
M. Moran	27 ft. 6 in. in depth
J. Reardon	27 ft. 6 in. in depth

It was necessary for a man to dig and load into buckets some 20 tons of stiff blue clay in eight hours of working time besides lagging and bracing the caisson. The ordinary or average depth attained in caissons of this size in eight hours is from 6 to 13 ft. in depth. The gold watch and prize money for best speed in eight hours was awarded to Michael J. Naughton, otherwise known to his fellow workmen as "The Submarine."

One day's work did not suffice, as there was an endurance contest going on at the same time, this race covering three days' time. This consisted of digging a four-foot diameter caisson, lagging and bracing the sides to a depth

of 52 ft., and the ordinary or average time required for the work is from 40 to 60 hours. The final result in the contest was almost as close as the speed race:

Tom Caufield	22	hours' working time
Michael J. Naughton	22½	hours' working time
M. Moran	23½	hours' working time
J. Reardon	24	hours' working time

The type of men were splendid specimens of manhood and were athletes of the Babe Ruth or Jack Dempsey build. After the race was over and just to show that it could be repeated in ordinary performance, two of the contestants made a distance the following date of 27 ft. 4 in. in eight hours' time. This may be explained by the fighting spirit of the race to which these men belong.

We are indebted for the above information to Joseph D'Esposito, chief engineer of the Chicago Union Station Company, and A. F. Klein, vice-president of the R. C. Wieboldt Company, general contractors for this work.

Education Means Economy

BY CHARLES H. SMITH

ECONOMY is a perennial subject with railroad executives, but at no time during the past several years has it been emphasized more than at the present. Evidences of attempts to economize—to reduce expenses—certainly are not lacking. On every hand railway employees are being reduced in number; work is reported being done under the contract system; the amount of materials used is, of necessity, being curtailed and, in general, means are being taken to lessen expenditures.

The wisdom of some of the methods taken to reduce expenses may well be questioned. Yet the intelligent employment and handling of labor is the basis of all economy. It is an axiom that the most economical labor is that performed by an efficient worker and at no time during the past several years has the opportunity for procuring efficient labor been better than it is at the present. Right now railroad executives can take their pick of applicants. They can recruit their forces to the full number necessary to perform the work at hand, employing only the pick of the workers. They have an opportunity to "catch up" with work that has been postponed because of labor shortages; they can put their departments in shape to cope with the business that is sure to come shortly, and, furthermore, when business begins to boom they will not be obliged, if they take advantage of the labor market, to bid for labor—any kind of labor—in order to meet the demands made upon their departments.

Economy of labor and economy of materials—these are the two major divisions of economy which concern the division engineer, the roadmaster and the foreman. With the economy of labor, which is essentially a matter depending upon supervision, we shall not concern ourselves extensively in this article except to point out that economy of materials is, in a great measure, dependent upon it. As has been noted, efficient labor is economical labor—economical not only in the actual accomplishment of results, but in the use of materials as well. Efficient labor makes materials give the maximum of service; scrapped materials are carefully husbanded and returned to be utilized and work is done systematically, using the best methods and the results obtained are very satisfactory results. In the matter of economy of labor every foreman should have some of the attributes of a good pedagogue; he should qualify as a competent instructor of his men.

Efficient labor is always educated labor, for education along the proper lines is necessary for efficient accomplishment. When railroad executives fully realize this fact and take proper steps to meet it they are going to make great progress in the economical maintenance and operation of the track and departments under their supervision. The education necessary will not be accomplished merely by the circulation of printed bulletins among the rank and file. This has been tried and while it seems to meet with some success among certain classes of employees, the bulletins and circulars are not usually read by the employees holding minor positions. And these latter are the very men it is most necessary to reach. What is needed is education by example or demonstration; by talks that get down to the level of the men, and in addition to these things the best kind of supervision by those who are constantly in direct contact with the men. So much for the economy of labor.

In the matter of economy of materials the principal thing to impress upon the men who use them is that every piece of material which passes through their hands is the product of a tremendous amount of human energy. A tie plug is perhaps one of the most insignificant things that the average trackman uses—yet even this represents much energy. If the trackmen can be made to sense something of the history of it; something of what it took to transform the living tree into the finished product delivered to them to utilize, then perhaps they may handle even the humble tie plug with more respect than heretofore when it has not been uncommon to see dozens of the little blocks of wood scattered along the roadbed beside the track, left to rot. The trackman who carelessly scatters a few dozen plugs and neglects to pick them up, who leaves spikes, nut locks and tie plates to rust out on the roadbed here and there, dissipates, in some degree, the efforts of the many men whose energy manufactured the raw materials and transported them from their sources to the points where they should be used.

If trackmen and other railroad workers can get the proper viewpoint—that each and every piece of material which they use represents so much human energy—and that wasting material is equivalent to wasting human energy, then, we venture to say, there will be much less wasted. If a worker, realizing all this, still carelessly wastes material he is hopeless. Nothing remains to be done except to weed him out.

How can this viewpoint be given him? He can be told verbally by any person who will take the trouble to acquaint himself with the necessary facts and then present them to the worker in an entertaining manner. Better yet would be to present before his eyes the history of some of the things which he uses daily. The possibilities of the moving picture as a means of education have never been utilized to any great extent even in the schools. If some good films showing the actual history of the materials from the natural resources to the finished products were to be shown in connection with a speaker explaining entertainingly the processes shown on the screen the combination would be almost ideal.

But whether by means of lectures and moving pictures or by some other method the railroad worker must get the proper viewpoint before the greatest economy and efficiency—for the two go hand in hand—is possible. This can be accomplished only by education, which, expressing it differently, is saying that education means economy.

PICKING THE RIGHT MAN FOR FOREMAN

Two Practical Trackmen Discuss This All Important Subject

FEW REQUESTS for co-operation from the readers of the *Railway Maintenance Engineer* have been received with greater enthusiasm than a recent call for contributed discussions on the problem of maintaining an adequate staff of competent foremen. The members of the maintenance of way department are evidently very much alive to the fact that the foremen constitute the backbone of the organization. This was brought out most emphatically in a series of articles published in the September issue in which eight maintenance of way officers presented their ideas on this problem. Because of the interest manifested in this subject, we present two other contributions on the same subject below.

THE SUPERVISOR SHOULD MAKE THE SELECTION HIMSELF

By P. J. McAndrews

Roadmaster, Chicago & North Western, Sterling, Ill.

THE responsibility of the foreman in the matter of physical safety of the track under his direct charge is a matter of first importance, a secondary absolute requirement being the responsibility of keeping the time of the men under his charge and making economical use of the materials allotted for use on each particular section. Few employees are entrusted with the expenditure of more money and none carries more responsibility, yet with few exceptions the selection, training and development of the track foreman has been left largely in the hands of the roadmasters and supervisors, with the result that as the class of laborers deteriorated, so also did the average quality of the foremen gradually lower. The selecting and training of section foremen is one of the very important duties devolving on the supervising officer in building up an organization for track maintenance, the supervision of the foreman's work in later years being easier in proportion to the degree of proficiency attained by the young foreman.

Fortunate is the officer when within his organization there are laborers from whom young, energetic men with common school education may be selected in the percentage necessary to keep up a roster of good foremen. The class commonly called "native" or more properly "home" labor is the most fruitful field from which to select the candidates for foremen's positions, although several classes of foreign labor have among them a small percentage of men who are capable of development into fair and quite often excellent foremen, their services being valuable when laborers of their own class predominate.

Writing on our subject (as we must) rather from a local standpoint, it may be said that the plan followed by the writer is to observe the men at work. One must take into consideration their disposition to do their task without grumbling and their relations with their fellow laborers and their foreman. Note also whether they have the "knack" of taking advantage of the work and doing it the easier ways without shirking or skimping, and check their record as to working steady, and from their work and general appearance form judgment as to their probable value as a foreman.

In our judgment it is not wise to take a third party into confidence on the matter of the candidate's abilities until it is decided to give the man a trial as an assistant foreman. It is often found that if the foreman of a gang is informed that the roadmaster has his eye on young Jones, who works in the gang, a special effort will be made to play up the ability of that individual beyond his natural limits, and later on when he is given charge of a crew he fails to make good.

We are permitted to pay a small amount above the laborers' rate to a limited number of men, classified as student or assistant foremen, the usual plan being to fill all regular assignments of assistant foremen from men who have been selected for promotion to foremen's position when seemingly fitted and a vacancy occurs. Temporary vacancies made through sickness or absence of foremen are filled by appointment of a student foreman, thus giving opportunity for a trial.

The length of an apprenticeship before appointing the candidate to a foreman's position will in a measure depend on the class of road, and especially the class of a section he will probably be placed in charge of, such, for example, as a section with considerable switch work, or one where there may be few, if any, switches.

For yard work the foreman needs a longer period of training, and the writer believes that even in the most favorable conditions no man should be given charge as a foreman with less than two years' service as laborer and at least six months as assistant foreman, although the period of apprenticeship is something that we find difficult to fix by even an approximate rule. In parts of the country where on account of extreme temperatures winters are severe on track, we believe that to reach a degree of competency the foreman should work at least two years under a capable instructor as laborer.

The above is an outline of the writer's method of selecting foremen, the training being done in the position of assistant foreman, by personal instructions from roadmaster and foreman and actual performance of the work under the direction of a competent foreman. So long as conditions continue such as to induce the right class of laborers to enter employment in track maintenance this method should enable us to recruit our foremen from the ranks (from which they all should come), but in the event of wages and working conditions becoming repulsive to men of average intelligence and the position of section foreman being made less attractive, the problem of securing men for those positions will be difficult of solution.

Possession of a high average class of foremen does not necessarily mean a successful division's maintenance organization unless these men are properly handled, that is, there must be a close co-operation between the supervising officer and his subordinates. We should not "railroad" by circular, neither should we maintain track by having the roadmaster motor car from gang to gang every day or two and direct the work of each foreman in detail. The former method results frequently in a gradual disregard of written instructions on account of the frequency of issuing them, while the latter method takes all initiative out of the men and they get so used to having the supervisor tell them what to do that they scarcely know how to do anything without being told.

There is a happy medium as between the two methods, and in our judgment occasional personal visits from the supervising officer to talk things over with the foremen, commend them in the presence of their men for good

progress being made or when some special piece of work has been done, and show the gang that we have confidence in our foremen will raise the morale of the crew. It is needless to say that criticism of the foreman should always be private.

The problems of the company in maintenance matters should be shared with supervising officers and by them with the foremen, and discussion of these problems individually with the men when opportunity is presented, as well as in groups by holding meetings, will in every instance be found beneficial. Such meetings with the foremen should be held quarterly, early in January, April, July and October, to discuss the seasonal work.

Simplify as far as possible the reports required from foremen and limit the correspondence to actual needs for carrying on the business. The time may come when men with higher education will hold the position of section foremen and we hope our managements will realize the importance of a foreman's job and encourage the employment and training of educated men for these positions, but just now and for some time in the future we shall have as foremen men with limited education, and we should not lose sight of this fact in dealing with them in avoiding the use of algebraic methods in the foreman's track accounting.

Study the foremen's weak points and pay special attention to their correction, be patient, pleasant and optimistic in dealing with these men and they will always be pleased to have you stop and see them, and better yet, you will earn their confidence and deserve their best efforts.

PICK THE FOREMAN OUT OF THE GANG

By G. G. Austin

General Roadmaster, Chicago Junction, Chicago

THE TRAINING of foremen is not a difficult matter if one is careful on the start to select men who possess the necessary foundation. Hardly a day passes when foremen in charge of work are not called upon to decide matters of vital importance as regards track work. A successful foreman must have the initiative and energy to carry out the work his judgment dictates. Unfortunately, some of our very best trackmen do not possess these qualifications, and for that reason the roadmasters of today are up against it, so to speak, for the necessary material to develop. It is nothing uncommon to hear employees of other departments make the remark, "Oh! he is only a trackman," forgetting that this trackman, of whom he is speaking so slightingly, is a very important cog in the operation of a railroad and the safety of transportation depends upon him as much, if not more, than on any other class of railroad employees.

A good track foreman does not work according to a book of rules which tells him what to do every day of the year—he does not simply follow orders as do other employees of a railroad. On the contrary, he is generally forced to use good, sound judgment in his daily work, and a trackman who does not possess this qualification should never be selected as a candidate for foreman.

It is my opinion that no specific rules can be laid down for the training of trackmen to fill the position of foreman. I believe that local conditions govern this to a certain extent. Some roadmasters, whose territory is not near large cities, quite often have the opportunity to pick up young men of good habits and clear brains who are desirous of following track work as a livelihood, while other roadmasters, who have territories adjacent to and embracing large cities, have what is known as the "floater" to contend with, and it is hard for them to obtain men with the right qualifications to train, particularly with the class of labor we are forced to work today. The avenues for promotion of maintenance of way men on the majority of roads are so few that there are not many inducements we can offer young men of the right caliber to take up track work as a livelihood and use a No. 2 shovel until they are qualified to hold the position of foreman. With these conditions to contend with, I have seldom attempted to induce any man to take up track work with a view of training him for the position of foreman, but on the contrary I have been fairly successful in picking my men from the ranks.

However, I am satisfied that the pathway of a roadmaster could be made much smoother if his management would permit him to create in every gang the position of what might be termed assistant foreman, which would carry with it a higher rate of pay than that received by the other men of about ten cents per hour. This would create a certain amount of rivalry, and as a result every laborer who had ambition and was desirous of obtaining this position would put forth his best efforts to convince the roadmaster that he was capable of holding it. Then it is up to the roadmaster to develop his man. This should be done through fair and square treatment, playing no favorites, as many a good man has been ruined by the forming of the opinion that he stood in with the roadmaster or some other officer.

A foreman's success depends largely upon the interest he takes in his work—his ability to see and act promptly on little things, and the pace he sets for his men. He should have the courage of his own convictions, assuming, of course, that he thoroughly understands the work required of him.

As regards the length of time required for a man to acquire the necessary experience to qualify him for promotion to position of foreman, I feel as if this depends largely upon the man himself. I can recall cases where one man was developed in about eighteen months, while another required four years, but in the end they were both excellent foremen who could hold their own on any class of track work.

My experience has been that there is little or no trouble in holding men while you are training them for the position of foreman, as they are looking forward to the time when they will have charge of a gang, but when this position has been attained and they realize the responsibility that a track foreman carries on his shoulders, whether at home or on the work, the question arises within himself, "Do I receive just compensation for the position I am holding and the responsibility it carries?" The decision on this question, I am satisfied, has been the cause of more than one good foreman leaving the position he was holding to accept an offer from some contractor or to enter a new line of work entirely.

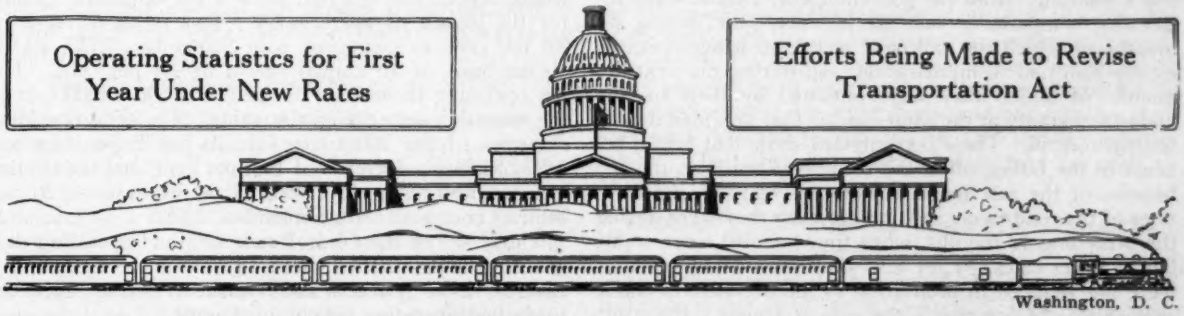
In conclusion, I am not in favor of making it a business to try and find young men who, in my judgment, might possibly be trained for successful foremen and try to have them enter the service. On the contrary, I prefer to pick my men from the ranks, regardless of nationality, and when I, in a measure, have decided on my candidate, I put forth every effort possible to train him for the responsibility he will have to assume, and 60 to 90 days will decide whether or not I have made a wise selection.

As regards holding a foreman after he has been trained to fill the position, I am of the opinion that this depends largely upon the treatment he receives from his superiors, as the days of "rawhiding" have passed. If he is given credit for the work he does and when necessary his attention is called to any mistakes that are made in a fair and honest way and the right compensation given for the responsibility he carries, it may confidenty be stated that little trouble will be met in holding the foremen.

RAILWAY AFFAIRS AT THE NATION'S CAPITAL

Operating Statistics for First Year Under New Rates

Efforts Being Made to Revise Transportation Act



Washington, D. C.

THE SPECIAL session of Congress called by President Harding shortly after his inauguration is about to close without any legislation to amend the Transportation act, but is is evident that the opposition to it has been only staved off and that the fight must come to a showdown in the next regular session which begins on December 5. All through the session vigorous efforts have been made to bring about a repeal of Section 15-a of the law, the 5½ per cent rate-making rule, as well as the provisions of Section 13-a, under which the Interstate Commerce Commission has ordered the increase of intrastate rates in many states to remove discrimination against interstate commerce. At this writing none of the bills for this purpose have gotten through the committees to which they were referred, although the Senate committee has been holding hearings on them since October 24 and for a time it was thought likely that it would at least report favorably a bill which would restore the power of the state commissions to reduce rates below the level which the Interstate Commerce Commission has held reasonable for interstate commerce.

The primary purpose of most of the bills to amend the act is to get rates reduced. Although the question of state rights is also involved and the state railroad commissioners and the members of Congress whom they have been able to influence are also concerned about the powers and the jurisdiction of the state authorities, it has been apparent throughout that the right of the states to reduce rates faster than the Interstate Commerce Commission is inclined to do it is the principal object sought. The campaign against these provisions of the act has been conducted in Congress by members of the so-called agricultural bloc, with the assistance of such professional anti-railroad men as La Follette and others whose primary purpose is to embarrass the railroads, and outside of Congress mainly by the state commissioners and certain shippers of agricultural products and live stock. While they have not yet succeeded in persuading even a committee of the justice of their position, they have been able to delay until next session consideration of the so-called railroad "funding" bill, to authorize the Railroad Administration to raise the money it owes to the railroads for the period of federal control by selling notes taken from the railroads for their indebtedness to the government for additions and betterments.

Although the roads have earned less than 3 per cent since the rates were made effective and although there has been no effort since the volume of traffic fell off to increase rates to a point that would produce 5½ per cent return, there has been a widespread belief that a repeal of the law would bring rates down. In addition to a large number of reductions in rates voluntarily made by the railroads, the Interstate Commerce Commission in August recommended to the roads a reduction in livestock rates for the benefit of the farmers, which was put into effect, and recently the commission told the roads, without issuing a formal order, to reduce the western grain rates by half of the increase made last year. After the Labor Board had announced, however, that it could not consider further wage reductions until it has cleared the docket of other matters, the railroads were not willing to make such a reduction, which would surely be followed by demands for like reductions in other rates, and after a conference between its executive committee and the Interstate Commerce Commission the Association of Railway Executives announced its intention of making a 10 per cent reduction for six months in rates on all agricultural products, except in New England, in place of the grain rate reduction in the west. The roads will apply to the commission for a rehearing of the grain case, and also for a "general inquiry by the commission to ascertain whether, until a substantial reduction can be secured in the labor and other costs of operation, any further reduction in rates could lawfully be required, or, with due regard to the transportation industry, is possible."

While a large number of people seem to believe that a reduction in rates is necessary to stimulate business, many others are convinced that an almost equal stimulus would be afforded by an official pronouncement that there can be no substantial reduction in rates generally under present conditions, so that business would cease holding off to wait for lower rates.

Traffic Peak for This Year Passed

The volume of railroad freight traffic, after having steadily increased during the summer and fall months, apparently reached its peak for this year during the week ending October 22 or about the same time as it has in previous years. During the early part of the year freight traffic was approximately 25 per cent below the mark set in 1920, but during the latter part of October the number of cars loaded weekly reached within 5 per cent of the record week of 1920. For the week of October 22 it was 962,000, as compared with 1,010,000 in 1920, but for the next week it fell sharply to 829,000. The high point of the year was reached about October 22 in both 1919 and 1920, although the seasonal reduction began earlier in 1918. The number of surplus freight cars, which has been steadily growing smaller since spring, also reached its low point for the year during the week ending November 1, when there were 80,203 serviceable cars for which no freight was offered. During the next week there was an increase to 92,000. There were also 345,201 bad order cars on November 1, or 15 per cent of the total, which represents a reduction of over 1 per cent as compared with the number a few weeks back.

Statistics for First Year Under Increased Rates

An analysis of railway statistics compiled by the Bureau of Railway Economics for the 12 months ending August 31, 1921, the first full year since the general rate

advance of August 26, 1920, and also the first year since the war during which the railroads were operated without a guaranty from the governmment, affords some interesting comparisons with the previous year, during six months of which the railroads were still being operated by the Railroad Administration, and during the next six months of which they were operated by their owners under a guaranty at the same rate as that provided during federal control. These comparisons show that while, because of the falling off in the volume of business, the full benefits of the rate increase were not realized, the revenues of the roads were still greater than they were during the preceding 12 months, when they handled more traffic but at lower rates. They also show that while expenses were not reduced in proportion to the decrease in traffic (which was 14 per cent in the case of freight), the roads were able to effect economies sufficient to hold the expenses lower than they had been in the year before in spite of the 22 per cent increase in wages awarded by the Labor Board in 1920. This was in effect for 10 months of the year ending August 31, 1921, but for only 4 months of the year ending August 31, 1920. For the months of July and August, 1921, the wages were about 12 per cent lower than they had been since May 1, 1920.

The net operating income of railroads for September, as reported to the Interstate Commerce Commission, was less than that reported for August. Returns for all the Class I railroads except the Detroit, Toledo & Ironton, whose report was delayed, show a net operating income for the month of $87,174,064. This is an increase of 9.4 per cent, as compared with September, 1920, and is on the basis of an annual return of 4.6 per cent. The net operating income for August was $90,000,000, or at the rate of 5 per cent on the value. The total operating revenues of the 200 Class I roads for September was $497,653,746, a decrease of 19.6 per cent, and the operating expenses were $377,106,272, a decrease of 26 per cent, as compared with September, 1920.

Thirty-six of the Class I railroads had operating deficits for the month. Of these, 18 were in the Eastern district, 10 in the Southern and 8 in the Western. Fifty-six roads had operating deficits in August.

Expenditures for maintenance, while considerably less than those for September, 1920, showed little difference from the amounts expended in August. The expenditures in September for maintenance of way and structures amounted to $72,556,000, a decrease of 23.3 per cent, as compared with September, 1920, and approximately $616,000 more than for August, 1921. Expenditures for maintenance of equipment were $103,539,000, a reduction of 22.7 per cent, as compared with September, 1920. For August it amounted to $105,482,000.

What the Labor Board Is Doing

THE STRIKE is settled, but what next? This is the question that is being asked by everyone who has been following the activities of the Labor Board and the contesting parties before it ever since its organization. There is no question but that the ending of the strike was a partial victory for the brotherhood leaders. They were not compelled to run the risk of an actual walkout, which was thoroughly unpopular with the American public, yet they were successful in staving off temporarily any further reduction in wages. In other words, the action of the board, which resulted in calling off the strike, has been compared by some to the surrender which President Wilson and Congress made to the brotherhoods in 1916.

At the same time there is a very serious question as to just what the statement of the Labor Board signifies. This statement, which appeared in part in the *Railway Maintenance Engineer* for November, purports to say that the Board has so much work ahead of it with regard to national agreements and other matters that it will be a long time before any further wage reductions can be considered. In fact, the time has been estimated anywhere from eight months to a year. However, members of the Board have pointed out that no definite promises of any kind have been made to the men, and this fact, coupled with the progress that is being made by the Board in disposing of disputes now before it, naturally leads to the conclusion that hearings on further wage reductions are not far off. In the meantime, the railroads throughout the country are notifying their employees of proposed further wage reductions and are calling for conferences with their employees in order that individual disputes may be certified before the Labor Board. It is, therefore, expected that this matter will be in the hands of the Board before the end of the present year.

Another interesting development is the agitation for a modification of the form and character of the Labor Board. Thus, the National Industrial Traffic League, at its recent convention in Chicago, favored changes in the Transportation Act that would provide for the formation of a new board consisting of five men, all of whom are public representatives, with no members of the board representing either the railways or the men. A great many others have advocated a closer co-ordination between the board and the Interstate Commerce Commission with the idea that there must be a closer relation between the body which fixes the rates and the one which fixes a large proportion of the expenses of the railways. However, members of the Interstate Commerce Commission have indicated that the commission had no sympathy with this plan and apparently would be disinclined to assume responsibility for the work of the Labor Board. At the same time the commission has indicated in some of its recent decisions that the railroads must make every effort to reduce expenses. The present indications are that no changes will be made in the character of the Labor Board or the scope of its authority.

CARRIERS' ABILITY TO PAY CONSIDERED IN DECISION

The Labor Board recently made a decision with respect to wage disputes between the New Orleans Great Northern and its train service, engine service, maintenance of equipment employees and several other groups of employees, which is of interest for two reasons. The Board definitely took into consideration the fact that the financial condition of the property was such that it had a limited ability to pay wages and also that the territory occupied by this road is one in which living expenses are relatively low. These principles are expressed in the two paragraphs given below, which are abstracted from the committee's report and in pursuance of this attitude expressed some appreciable reductions in wages were made:

"It is a matter of common knowledge that in the territory served by this carrier the question of rent does not bear the same excessive relation to the living budget as is evidenced in large centers, and it is worthy of note that none of the employees here involved are required to live in large centers.

"The Board is sympathetic with the principle that 'the ability of the carrier to pay' is not a controlling factor in fixing wages, but recognizes that it is entitled to secondary consideration with a certain type of carrier dependent almost entirely on local busi-

ness, or whose principal function in the final analysis is the development and upbuilding of a new or comparatively new country."

Recent discussions by the Labor Board on controversies affecting maintenance of way employees include the following, which are taken from the published records of the board:

PAYMENT FOR TIME LOST WHEN ON STRIKE

The first decision involved a controversy between the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers and the Cleveland, Cincinnati, Chicago & St. Louis Railway in regard to the reinstatement of a bridge and building foreman and pay for time lost by that employee and other members of his gang, who were on strike from April 13, 1920, to May 25. In the latter part of March, 1920, the Big Four Railway negotiated with a local contractor for the installation of some shelving, partitions, etc., in the basement of its office building in Cincinnati. The contractor was to furnish the material at a certain amount, and the labor to install it for a separate amount. At the time that this contract was made the carpenters of Cincinnati, other than those in railway employ, were on a "vacation" and because of this fact a provision was incorporated in the contract to the effect that if this "vacation" had not terminated at the time the contractor was prepared to undertake the work, the railroad would furnish the necessary labor and the contractor the necessary supervisor. This "vacation" was still in force when the contractor was ready to proceed with the work and the railway assigned certain employees to perform it. When these employees learned that the supervisor of the contractor was to superintend them they refused to proceed and the contractor was excused from further connection with the work.

In later conferences the road was requested to permit the men to resume work without being required to perform the work to which they had objected, which request was denied. After an exchange of numerous letters, the employees were advised by the road that they would be permitted to resume work in their old positions with seniority as of April 13, 1920, provided that the carrier was notified of their wish to do so not later than May 25, after which time they could not expect to resume service with the company except as new employees. All of the men with the exception of the foreman gave proper notice that they would resume work, and did resume work on May 25. The foreman did not then and has not since requested reinstatement or re-employment on his own part or signified to any officer of the road that anyone else was authorized to act in his behalf.

In bringing the controversy before the Labor Board, the brotherhood applied for reinstatement of the foreman and pay for time lost by him and the other men of his gang. In its decision the Labor Board decided that the men, including the foreman, left the service of the railroad of their own accord and therefore denied payment for the time lost.

CLASSIFICATION AND COMPENSATION OF A PUMPER

The same brotherhood of maintenance of way employees also filed a complaint against the Missouri Pacific with regard to the classification and compensation of a pumper at Piedmont, Mo. This man is paid a monthly salary in accordance with the maintenance of way national agreement, the salary being based on ten hours' service per day. In addition to looking over the pumping machinery his duty also includes the mixing of chemicals, testing and treating raw water, furnishing the system chemists with samples of both raw and treated water periodically, keeping a record of all chemicals used and making reports regarding the activities of the plant, and performing other work incidental to the operation of a water-treating plant. The time actually engaged in the work is from six to eight hours per day. The brotherhood contended that as this pumper was held responsible for the operation of the treating plant in addition to that of the pumps, he should be classed in a supervisory capacity and paid a salary based on a 26-day month, eight hours per day, with time and a half for overtime for all work performed after eight hours and pro rata for Sundays and holidays in addition to this regular monthly salary. The Labor Board denied this claim for reclassification.

A FOREMAN'S COMPENSATION WHEN HIS GANG IS LAID OFF

An extra gang on the Norfolk & Western was laid off from December 19, 1920, to January 3, 1921. The foreman in charge of this gang had been promoted from section foreman, both positions being paid on a monthly salary. The foreman did not apply to the road for the privilege of returning to his former section, nor did the road offer to return him to that position.

The employees contended that inasmuch as this foreman was employed by the month and had not asked for a leave of absence, he was still subject to the instructions of the roadmaster and that, although he received no instructions regarding his duties during the period in which his gang was laid off, he should be compensated for that time.

The road maintained that this foreman performed no work during the period in question and that it was his duty to have requested that he be returned to his section if he wished to work during that period. The road further contended that it was not its duty to return this foreman to his section arbitrarily, although he could displace the section foreman having the least seniority if he did not wish to return to the section from which he came.

The Labor Board in its decision took the position that, while the rules in the National Agreement expressly provide for the retention of senior men in case of force reduction or temporary assignment, it does not appear from the evidence that the employee in question made the proper effort to take advantage of these provisions and it thereby denied his claim for compensation.

SENIORITY RIGHTS OF EMPLOYEES ACCEPTING SUPERVISORY POSITIONS

On August 1, 1919, the Southern Pacific Lines in Texas and Louisiana promoted a section foreman to roadmaster and the section made vacant was bulletined and bid in by another man. On October 1, 1920, this roadmaster was demoted and returned to the position he had formerly occupied as section foreman.

The employees, through their organization, contended that in accepting the position of roadmaster this foreman had forfeited his rights as a section foreman after 30 days and that in re-entering this work he should be considered as a new man and entitled only to such position as might be open. The road contended that its understanding with this foreman was that the assignment was temporary and that when released he would be permitted to return to his regular position as foreman.

In its decision the Labor Board took the position that (1) this promotion did not constitute a temporary appointment; (2) that the continuity of service was not disturbed by the appointment, and (3) that this man as a result of being demoted was entitled to the position as section foreman by displacing the junior (in point of service) section foreman as provided in the national agreement established for maintenance of way employees.

TOOL EQUIPMENT FOR PILE DRIVER OUTFITS*

A TRACK DRIVER should be equipped with a self-propeller, capable of a speed of 25 miles per hour; swinging leads to drive batter piles; a follower cap and followers; drop hammers of about 2,500 lb. and 4,500 lb., or a steam hammer of about 30-in. stroke; an air pump and air reservoir capable of furnishing air for two hammers or air boring machines; a dynamo for an electric headlight; carbide lights for emergency work; and with pump and equipment for jetting piles.

TOOL EQUIPMENT FOR A TRACK PILE DRIVER

1 tool car equipped with work bench, bins for bolts, spikes and washers, racks for bars, saws, augers, jacks, shovels, etc.; also lockers for small tools and parts.
1 combination bench and pipe vise.
1 anvil.
1 small forge and set of blacksmith tools.
1 small drillpress and set of ¼-in. to 1-in. drills.
1 set of pipe stocks and ½-in. to 1½-in. dies.
1 set of bolt stocks and ⅜-in. to 1¼-in. dies.
1 pipe cutter, ½ in. to 2 in.
2 pipe wrenches, 18 in.
2 pipe wrenches, 24 in.
2 monkey wrenches, 18 in.
2 ball pean machinist hammers.
1 hack saw and 12 blades.
6 double cut 16-in. files.
2 double cut 16-in. half round files.
2 hand cold chisels.
2 hand saws, one cross cut, 1 rip.

TRACK TOOLS

1 motor car.
1 push car.
1 track level.
2 track gages.
3 track wrenches.
6 track shovels, No. 2.
3 spike mauls.
2 track chisels.
2 track jacks.
2 claw bars.
4 picks.
2 track adzes.
3 track tampers.
1 grindstone and frame.

BRIDGE CARPENTER TOOLS

6 cross cut saws 5 ft. long.
1 saw clamp.
12 saw files.
6 axes, double bitted, with handles.
6 axe handles.
3 hand axes with handles.
3 adzes with handles.
4 wrenches for ¾-in. bolts.
3 monkey wrenches, 18 in.
3 chisel bars, 1⅛ in. by 3 in.
3 crowbars, 1¼ in. by 5 ft.
3 lining bars.
2 5/8-in. ship augers with double cranks.
4 1 1/8-in. ship augers with double cranks.
4 1 3/8-in. ship augers with double cranks.
4 lug hooks.
6 cant hooks.
6 peavies.
2 timber tongs.
6 claw hammers.
2 sledges, 16-lb., with handles.
1 motor driven circular saw.

MISCELLANEOUS TOOLS AND EQUIPMENT

1 set of 4 sheave blocks 3½ in. by 12 in. by 30 in.
1 set of 2 sheave blocks 2½ in. by 8 in. by 30 in.
1 snatch block 2½ in. by 6 in. by 16 in.
1 snatch block 3 in. by 9 in. by 16 in.
1 complete duplicate set of ropes and cables used on driver.
1 manila rope ¾ in.—200 ft.
1 manila rope 1¼ in.—500 ft.
1 manila rope 1½ in.—1,000 ft.
1 pile chain 2 in. diameter, 7-in. by 11-in. links—12 ft. long.
1 pile chain 1⅛ in. diameter, 5-in. by 7-in. links—12 ft. long.
1 pile chain ⅝ in. diameter, 2½-in. by 4-in. links—7 ft. long.
6 long handled shovels.
4 25-ton hydraulic jacks.
4 screw jacks, 24 in.
4 screw jacks, 12 in.
2 steamboat ratchets or pulling jacks, 30-in. screw.
4 jack chains, ¾ in. by 6 ft., ring on one end and grab hook on other end.
1 steam hose, 50 ft.
1 water hose, ¾ in.—100 ft.
3 pike poles 2 in. by 16 ft.
1 steel cable ¾ in. by 400 ft.
3 5-gal. oil cans.
6 12-qt. water pails.
1 set flagging equipment to conform with standard rules; lanterns, flags, torpedoes, fuses, etc.

*From a report presented at the convention of the American Railway Bridge and Building Association on October 18-20 at New York.

The report was accompanied by an appendix on the jetting of piles by R. C. Young, chief engineer, Lake Superior & Ishpeming and the following appendix prepared by George W. Andrews, assistant to the chief engineer of maintenance, Baltimore & Ohio, Baltimore, Md., on the equipment of floating pile drivers owned and operated by the B. & O.:

BALTIMORE & OHIO PILE DRIVER NO. 3

GENERAL DIMENSIONS AND EQUIPMENT

DIMENSIONS

Length of scow, 55 ft.
Width of scow, 23 ft.
Depth of scow (over all), 6 ft.
Height of leads, 65 ft.
Length of house, 24 ft.
Width of house, 15 ft. 6 in.
Depth of house, 13 ft.

EQUIPMENT

Lidgerwood engine with 8-in. by 12-in. cylinders, double drum with 2 niggerheads on engine and 1 on each side of house (outside).
Weight of hammer, 3,600 lb.
Length of hammer—fall line, 150 ft.
Plumbago, 5 in.
Length of pile fall (¾-in. steel cable), 300 ft.
Length of boiler, 98 in.
Diameter of boiler (with 2-in. tubes, upright), 48 in.
3-in. by 2-in. by 4-ft. pumps (double action), 1.
11-in. by 11-in. by 12-in. air pump (Westinghouse, with 1½-in. inlet, 1½-in. outlet and 1½-in. steam), 1.
Steam siphon (one on forward and one on back of scow), 2.
Air reservoir, 2 ft. 6 in. by 5 ft., 1.
Automatic air machine No. 5, 1.
½-in. to 1¼-in. auger bits, 2 sets.
4½-in. caulking auger, 1.
3½-in. caulking auger, 1.
Grindstone, 1.
10-in. emery wheel, Keystone, 1.
¾-in. air hose, 4 lengths.

SUPPLIES

14-ft. yawl boat, 1.
Iron purchase fall for ¾-in. wire cable, 1.
10-in. wooden snatch blocks, 4.
14-in. iron snatch blocks, 2.
6-in. double block and fall, 1.
8-lb. double block and fall, 1.
8-lb. double ended mauls, 6.
10-lb. double ended mauls, 2.
Anvil, 1.
Forge, 1.
Blacksmith tools, 1 set.
¾ to 1½-in. dies and taps, 1 set.
28-in. screw clamps, 1.
32-in. screw clamps, 1.
12-in. screw jacks, 2.
5-ft. steamboat ratchets, 2.
¾-in. to 3½-in. wrenches, 6.
150-lb. anchors, 2.
¾-in. cable for purchase fall, 200 ft.
Hack saw frames for 14-ft. blade, 2.
1¼-in. by 6-ft. pinch bars, 6.
Chisel bar, 2.
50-ft. lengths ¾-in. water hose, 2.
6-ft. wire rope slings, 4.
Double chains, 8 ft. long by ½ in. iron and 3½-in. link, 12.
5-ft. cross cut saws, 6.
Boat hooks, 16 ft., 2.
Cant hooks, 10.
Combination vise, 1.

Committee: J. A. Bohland (G. N.), chairman; G. W. Andrews (B. & O.), T. W. Bratten (S. P. Co.), A. J. Catchot (L. & N.), W. R. Gantz (Penna.), Maro Johnson (I. C.), G. W. Land (M. P.), K. Peabody (N. Y. C.), R. C. Young (L. S. & I.), Harry James (C. & S.).

THIS department is an open forum for inquiries and discussions relating to practical problems of common occurrence in maintenance of way work. The following are replies to questions asked in October:

USING TRACK CHISELS IN WINTER

What precautions should be taken to keep a chisel from breaking in cold weather?

FIRST ANSWER

A chisel should be slightly warmed. A common practice is for the section men to hold the cutting end of the chisel in the hands for a short time in order that some of the heat from the hands can be absorbed by the chisel. They also sometimes light a match and hold the cutting edge of the chisel in the flame for just a moment or two. The chisel should not be placed in a fire as this will draw the temper. Any slight increase in the heat of the chisel will, however, prevent it from breaking.

WILLIAM F. HART, President, Verona Tool Works, Pittsburgh, Pa.

SECOND ANSWER

This is a matter that is controlled by several different factors. They are as follows: 1. Chisels of the best quality should be used. 2. Care should be taken never to attempt any cutting with a chisel in zero weather without first warming it through. 3. The chisel when being used should always be raised and reset after each blow of the hammer. 4. The chisel should never be allowed to hit a glancing blow or, to express it differently, canted to one side after the cut has been started, for unless the chisel is handled carefully under such conditions it is likely to break under the strain of pounding. 5. Special precaution should be taken when cutting a surface that is narrower than the width of the chisel, as in cutting the edge of a rail base, for the reason that under such conditions the least creaning of the chisen after the first or second blow of the hammer is likely to result in breaking the chisel head. 6. Care should be taken that the point of the chisel does not become overheated during the cutting, as occasionally this also gives rise to breaking.

J. MORGAN, Supervisor, Central of Georgia.

What Answer Have You To Offer?

The following questions will be answered in the February Issue:

(1) How should a trackman safeguard himself when on sweeper duty in a snow storm?

(2) How should concrete materials be heated in cold weather?

(3) Is the use of storm windows practical and economical on railway stations?

(4) All pump jacks for well pumps and all gear drive wheels on combination pumps provide for two or more adjustments in the stroke of the pump. What considerations should govern in determining which stroke to use?

PROTECTING VALVE BOXES FROM FREEZING

How should valve boxes be protected in cold weather?

If the valve box is properly constructed, with a sufficient amount of insulation and the proper number of frost floors, very little additional protection should be necessary in cold weather. It is customary to cover exposed portions with tar paper and apply earth or manure before any frost is in the ground. In all cases where possible the valve stem should extend well above the covering.

B. W. DE GEER, Engineer Water Service, Great Northern.

PAINTING STUCCO

Is anything to be gained by painting or coating stucco?

Practically the only benefit to be gained by painting or coating stucco is to change or improve the appearance. Any desired color scheme can be worked out in the first instance with Portland cement stucco and, of course, the only way to change the color scheme used in original construction is by painting or applying an additional stucco coat.

There are quite a number of stucco paints on the market, but those who have become experienced in the use of Portland cement stucco through long practice are very positive in their claims that oil paints should not be used on stucco work. Sound Portland cement stucco can be recoated so as to produce the desired color effects, providing the old stucco has not previously been treated with oil paint or some other covering which will prevent a perfect bond between the old work and the new.

A. C. IRWIN, Engineer Structural Bureau, Portland Cement Association.

BRACING TRESTLE BENTS IN DEEP WATER

How can you brace falsework bents driven in deep water in a case where the caps are so close to water level that plank cross bracing cannot be applied above the water?

Our experience along this line is very limited, practically no occasion of consequence having arisen to require falsework in deep water anywhere on the system in con-

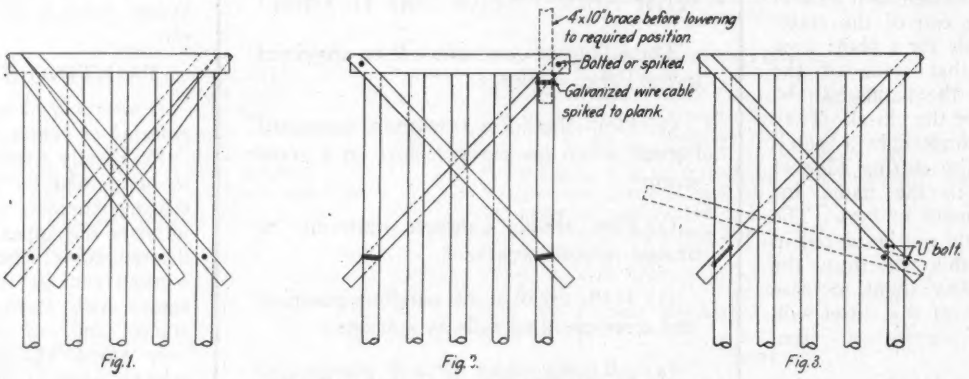
nection with bridges, except when building a double track incline trestle at Metropolis, Ill., in 1915 and 1917, where the lower portion of the trestle is under water. The trestle consisted of five-pile bents, spaced 14 ft. centers. The bents in the lower portion of the trestle were sway-braced under water with 4 in. by 10 in. planks. All drilling of holes was done by a diver with an ordinary ratchet brace and bit, and the placing and fastening of the bolts was also done by the diver. In this case the sway brace was fastened to all of the five piles in each bent, as shown in Fig. 1.

Another method which is commonly used, where the cap is just below or above the water, is to fasten one end of the sway brace to the outside pile with a standard length bolt and washers at whatever depth required before driving. This condition is represented by Fig. 2. After the piles have been driven the sway brace is swung into position, and the free end fastened to the cap, the brace also being fastened to the other piles if the intersections with the brace are not below the water level. This same method is then repeated when applying the brace on the other side of the bent. As will be noticed, this method only fastens the sway bracing to the outside piles where the bent is nearly submerged.

Still another method which is used is that of making a "U" shape bolt to fit the diameter of the pile and long enough to extend through the sway bracing in such a position that it can readily be lowered around the outside pile to the required depth. This method is shown by Fig. 3. After bolting the proper end of the brace to the pile by means of this "U" bolt and lowering that end to the required position on the pile, the brace is then swung into the required position, this swinging operating to twist the U shape bolt in such a way that it clamps itself tightly around the lower end of the pile, which is small in diameter. Care must be taken not to get too much of a twist on the bolt, otherwise it may crack or break the sway brace. Where "U" shape bolts are not desirable on account of the possibility of their breaking the sway brace, good galvanized wire cable has been extensively used, the method being to wrap it as desired around the brace and pile, then lowering it into position and twisting the sway brace into position in practically the same manner as it would be done when bracing according to the "U" bolt method.

If it is desired to sway-brace more than the outside pile as described, the same methods can be applied on any of the intermediate piles, grouping as closely as possible the upper ends of the sway-bracing which are fastened on the cap.

F. H. CRAMER, Assistant Bridge Engineer, Chicago, Burlington & Quincy.



Three Methods of Bracing Pile Bents in Water

DEFECTIVE TRACK CONDITION CAUSES WRECK

AS A RESULT of an investigation made by the Bureau of Safety of the Interstate Commerce Commission in conjunction with the Public Service Commission of the State of New York of a derailment of a passenger train on the Delaware, Lackawanna & Western near Apalachin, N. Y., on September 3, when one passenger was killed, 69 passengers and 8 employees were injured and considerable damage done to rolling stock, it was concluded that a defective condition of track was responsible for the accident.

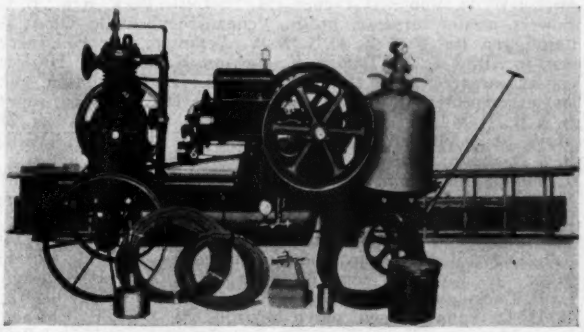
The investigation developed that work of raising, ballasting and replacing ties in the track in this vicinity had been in progress for several weeks, under the direction of the section foreman, and that on the day of the accident the work had consisted of raising the track from two to two and a half inches, and tamping, surfacing and lining it. It developed also that while this work was being completed for the day the foreman had instructed the work train to dump one car of ballast at about the point of derailment, but that by the time this work train had run to Apalachin on the eastbound track and had returned on the track upon which the ballast was to be unloaded and where the derailment occurred, it was raining so hard that, instead of stopping to dump the one car, the work train proceeded to a point farther west where the entire 14 cars in the train could be dumped, and that because of the continuation of the rain the train, after dumping ten of the cars, had proceeded into the clear for the train which was derailed.

The section foreman contended that after the storm subsided he had examined the track before leaving it and had found it to be in good condition in every particular, and was satisfied that the extra car of ballast at that point was not absolutely essential. Investigation developed, however, that measurements taken of the track alinement shortly after the accident by the general superintendent in which the center of the eastbound track, which was not disturbed, was used as a base line, gave results at different points which ranged from 12 ft. 9 in. to 13 ft. 7½ in., the latter measurement having been taken at the point of derailment.

During the investigation the theory was advanced that the alinement might have been disturbed by a passenger train which preceded the derailed train about 20 min. at a speed of about 50 miles an hour, but it was concluded from the testimony and information obtained that the track was not strong enough for the operation of high speed trains, the derailed train having been traveling at a speed which was estimated at 45 to 50 mi. an hour.

AN IMPROVED SPRAY PAINTING OUTFIT

The DeVilbiss Manufacturing Company, Toledo, Ohio, has recently made various improvements in its spray-painting equipment which are calculated to enlarge upon the usefulness and adaptability of this system of painting. The DeVilbiss system is one of painting by means of



The Two-Man DeVilbiss Hand Truck Spray Painting Outfit

compressed air, the equipment for this purpose consisting essentially of a gasoline engine or electric motor-driven air compressor with paint tanks, ladders, hose and other accessories mounted on trucks for various painting conditions and for operation by one or two men, as the case may be.

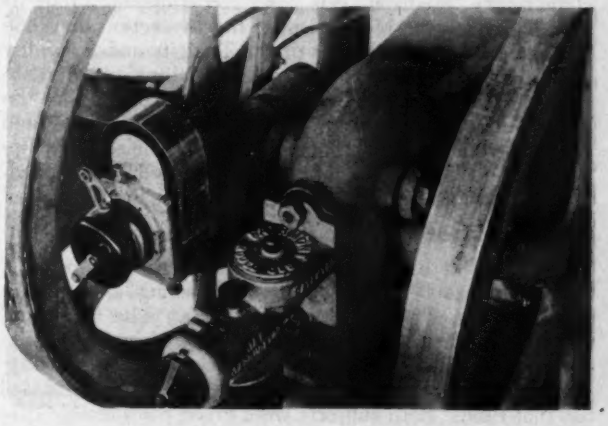
One of the modifications in that equipment which is usually provided for railway maintenance work involves the mounting of the compressing outfit on a three-wheel truck which can be turned within its own length. Also the weight of the outfit has been reduced about one-third, and the entire arrangement has been made more compact.

The gas engine is now of the horizontal type, equipped with a magneto and an automatic speed throttle governor. The compressor has also been improved to include an oil level indicator and is designed with a breather that excludes the entrance of all dirt and moisture. The air receiver for the compressor is placed in underslung position by reason of which the waste space is reduced and the entire outfit given better balance than before. Furthermore, it is more accessible for draining the tank and permits the tank to be drained under air pressure rather than by gravity.

As improved, the equipment consists of the gas engine compressing unit with canvas cover, ladders, a seven-gallon paint tank, sufficient hose for two operators working at a radius of 100 ft. from the compressor to the tank and 25 ft. from the paint tank to each operator. The equipment also includes the various repair parts and is designed to pass through a three-foot door.

A MAGNETO FOR MOTOR CARS

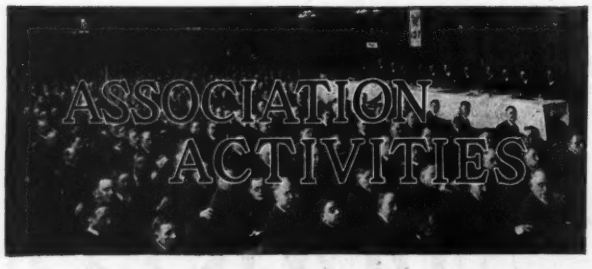
THE Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn., has introduced a magneto for its line of railway motor cars. This magneto is one of a number of machines with which the Fairmont Company has been experimenting for some time and similar to the magneto of the automobile, it is essentially a small electric dynamo which when properly connected with the moving parts of the engine and properly timed with the period at which the explosion of the gas is to occur, it will generate an electric spark suitable for igniting the explosive mixture in the cylinder. As the illustration shows, the magneto is carried on a bracket cast integral with the side bearing casting of the motor and is connected to the drive shaft



The Magneto Attached to the Engine

of the engine through a spindle. This spindle carries on one end the rotor of the magneto and at the other engages the drive shaft of the engine by means of two gears which are completely enclosed in a casing and which run in oil.

The magneto is of such a design that it will operate equally well in either direction and, of course, is intended to obviate the use of battery ignition either during the motion when the car is running or when it is being started. One point in particular advanced in support of the magneto is the fact that a satisfactory spark can be obtained in winter as well as in warmer weather.



AMERICAN WOOD PRESERVERS' ASSOCIATION

The program for the eighteenth annual meeting of the American Wood Preservers' Association, which will be held at the Hotel Sherman, Chicago, on January 24, 25 and 26, 1922, is rapidly nearing completion. Reports will be presented by the committees on Preservatives; on Treatment, (A) fir ties, (B) car lumber, (C) pressure treatment of poles, (D) non-pressure treatment of poles, (E) inspection; on Plant Operation, (A) peeling ties, (B) adzing, boring and perforating layouts, (C) car loading, (D) insurance, (E) pressure machinery, (F) handling of material; on Utilization and Service, (A) economies, (B) track, (C) flooring and paving; and on San Francisco Bay Marine Piling. In addition to these reports papers will be presented by Earl Stimson, chief engineer maintenance of way, Baltimore & Ohio, Baltimore, Md., on the topic, "Should the Increased Cost of Treating Ties be Charged to Maintenance or Capital Account?" by E. E. Pershall, vice-president, T. J. Moss Tie Company, St. Louis, on "Factors Affecting the Cost of Treated Cross Ties;" by a representative of the United States Forest Products Laboratory on "Results of Service Tests of Treated Mine Timbers, Including Data on the Relative Expense of Treated and Untreated Timber;" by V. K. Hendricks, consulting engineer, Terra Haute, Ind., on "The Annual Charges for Cross Ties;" by Ernest Batement, chemist in forest products, Forest Products Laboratory, Madison, Wis., on "Experimental Proof of the Theory on the Mechanism of the Protection of Wood by Preservatives by Means of the Toxicity and Solubility Partition of a Number of Tar Acids;" by C. J. Humphrey, Forest Products Laboratory, Madison, Wis., on "Mine Timbers;" by Mr. Horner on "The Need and Practicability of Mine Timber Preservation and the Opportunity Which This Situation Presents to the Wood-Preserving Industry," and by O. E. Jacobs on "Vacuum."

METROPOLITAN TRACK SUPERVISORS' CLUB

As a result of the circularization of the membership, Saturday has been chosen as the meeting day for the Metropolitan Track Supervisors' Club. The last meeting was held at the Hotel Martinique, New York City, on November 12, two subjects, namely, Methods of Laying Rail and the Use of Weed Killers, being discussed at that time. Both subjects were given considerable consideration, especially that in regard to the practical value of weed-killers, the consensus of opinion being that this method offered an economical means of combating and keeping under control the growth of weeds and grasses in the roadbed. After a short talk by A. M. Clough (N. Y. C.), representing the International Track Supervisors' Club of Buffalo, N. Y., it was decided to send one or more members to Buffalo to confer with representatives of that organization and the Maintenance of Way Club of Chicago relative to the preparation of a constitution and by-laws that could be adopted by these and similar organizations. The topic selected for the next meeting was the form of organization for the maintenance and operation of motor cars and tie tamping devices.

MAINTENANCE OF WAY CLUB OF CHICAGO

The next meeting of the Maintenance of Way Club of Chicago will be held at the Auditorium Hotel on the evening of Wednesday, December 14. J. S. Robinson, division engineer of the Chicago & North Western, Chicago, will present a paper on the relation of the growing weight of train loads to the weight of rails. The meeting will be preceded by a dinner to be served at the hotel at 6 p. m.

AMERICAN RAILWAY BRIDGE & BUILDING ASSOCIATION

Although the annual convention was held only a month ago, the newly elected officers are already well started in their work for the year. The following members have been selected for service on committees:

Pile Driving Records—A. M. Swenson (chairman), asst. supt. B. & B., M. St. P. & S. S. M., Minneapolis, Minn.; N. C. Ailes, engr. of records, D. & H., Albany, N. Y.; L. B. Alexander, asst. brdg. engr., M. C., Detroit, Mich.; L. M. Blake, supvr. B. & B., B. & M., St. Johnsbury, Vt.; F. C. Baluss, engr. B. & B., D. M. & N., Duluth, Minn.; A. C. Copland, office engr., C. & O., Richmond, Va.; H. Favreau, brdg. insp., G. T., Montreal, Que.; A. Fraser, supvr. B. & B., S. P., Bakersfield, Cal.; T. N. Heron, asst. to engr. M. of W., A. & V., Vicksburg, Miss.; K. Peabody, supvr. piers & bldgs., N. Y. C., New York, and G. A. Rodman, gen. supvr. B. & B., N. Y. N. H. & H., New Haven, Conn.

Labor Saving Devices in Routine Bridge and Building Work—J. S. Huntoon (chairman), asst. brdg. engr., M. C., Detroit, Mich.; W. H. Vance, dist. engr., M. P., Little Rock, Ark.; S. C. Bowers, master carpenter brdgs., Penna., Steubenville, Ohio; E. Cahill, gen. for. B. & B., D. L. & W., Scranton, Pa.; E. Druery, gen. for. B. & B., A. T. & S. F., Newton, Kan.; A. W. Harlow, master carpenter, Erie, Huntington, Ind.; B. L. Johnson, gen. master carpenter, G. N., Spokane, Wash.; D. L. McKee, supvr. B. & B., P. & L. E., McKees Rocks, Pa.; S. C. Tanner, supt. M. of W. shops, B. & O., Martinsburg, W. Va., and D. T. Wells, B. & B. supvr., O. S. L., Nampa, Idaho.

Building Inspection and Records—F. H. Soothill (chairman), bldg. supt., I. C., Chicago; R. J. Bruce, gen. bldg. insp., M. P., St. Louis, Mo.; A. C. Cutler, gen. bldg. for., N. Y. N. H. & H., Hartford, Conn.; E. J. Fraser, supvr. of bldgs., N. Y. C., Toledo, Ohio; B. W. Guppy, engr. of structures, B. & M., Boston, Mass.; A. T. Hawk, engr. of bldgs., C. R. I. & P., Chicago; L. P. Cockingham, master carpenter, C. & E. I., Danville, Ill.; N. H. La Fountain, gen. supvr. bldgs., C. M. & St. P., Chicago; E. C. Morrison, div. engr., S. P., San Francisco, Cal., and R. J. Walsh, bldg. insp., N. Y. C., Weehawken, N. J.

Relative Merits of Wooden Steel and Concrete Tanks—F. A. Eskridge (chairman), asst. engr., C. & E. I., Chicago; C. P. Rawson, architect, C. M. & St. P., Chicago; F. M. Case, for. water service, C. & N. W., Belle Plaine, Ia.; L. A. Cowsert, for. water service, B. & O., Dayton, Ohio; James Dupree, supt. water dept., C. M. & St. P., Chicago; D. D. Everett, for. water service, Erie, Jersey City, N. J.; J. F. Luxton, supvr. water service, P. M., Saginaw, Mich.; Emil Detzman, for. water service, A. T. & S. F., Fresno, Cal.; A. A. Seay, supt. water service, S. A. L., Walso, Fla.; C. F. Warcup, for. water service, G. T., St. Thomas, Ont., and E. A. Demars, for. water service, O. S. L., Bingham, Utah.

The Painting of Structural Steel—E. G. Storck (chairman), master carpenter, P. & R., Philadelphia, Pa., E. S. Airmet, for. painter, O. S. L., Salt Lake City, Utah; Charles Ettinger, supvr. B. & B., I. C., Chicago; George M. Hoffman, for. painter, P. & R., Shamokin, Pa.; George Montgomery, for. painter, G. T., Stratford, Ont.; B. D. Rich, for. painter, S. P., Stockton, Cal.; W. W. Turnbull, for. painter, G. T., Allendale, Ont.; William Gray, for. painter, Long Island, Brooklyn, N. Y.; D. W. Heuss, supvr. B. & B., C. C. C. & St. L., Indianapolis, Ind.; A. J. James, gen. for. B. & B., A. T. & S. F., Topeka, Kan., and G. J. Klump, supvr. brdg., N. Y. C., Jersey City, N. J.

The Framing of Bridge Timbers Before Treatment—A. B. Ilsley (chairman), engr. brdgs., Southern, Charlotte, N. C.; H. H. Harman, engr. bridges, B. & L. E., Greenville, Pa.; George W. Rear, gen. brdg. insp., S. P., San Francisco, Cal.; Hermann von Schrenk, consulting timber engr., St. Louis, Mo.; A. B. McVay, supvr. B. & B., L. & N., Evansville, Ind.; C. F. Womeldorf, div. engr., C. & N. W., Norfolk, Neb.; G. C. McCue, gen. supvr. B. & B., G. T., Ottawa, Ont.; R. E. James, supvr. B. & B., L. V., Sayre, Pa.; R. F. Farlow, supvr. B. & B., B. & O., Staten Island, N. Y.; A. G. McKay, supvr. B. & B., N. Y. N. H. & H., New Haven, Conn., and E. L. Loftin, supvr. B. & B., A. & V., Vicksburg, Miss.

Handling and Driving Concrete Piles—T. H. Strate (chair-

man), engr. trk. elevation, C. M. & St. P., Chicago; Maro Johnson, asst. engr., I. C., Chicago; A. S. Clepton, supvr. B. & B., M. K. & T., Oklahoma City, Okla.; S. T. Corey, asst. brdg. engr., C. R. I. & P., Chicago; O. F. Dalstrom, brdg. engr., C. & N. W., Chicago; A. W. Reynolds, asst. master carpenter, Penna., Jersey City, N. J.; R. E. Shean, supvr. brdgs., C. B. & Q., Chicago; R. H. Reid, supvr. brdgs., N. Y. C., Cleveland, Ohio; E. E. Brink, supt. B. & B., L. E. & W., Tipton, Ind.; E. H. Brown, supvr. B. & B., N. P., Minneapolis, Minn., and J. K. Melton, photographer, I. C., Chicago.

The Construction and Maintenance of Sewers and Drains—W. B. Hotson (chairman), supt. B. & B., E. J. & E., Joliet, Ill.; L. Beck, supvr. B. & B., Virginian, Victoria, Va.; A. J. Catchot, supvr. B. & B., L. & N., Ocean Springs, Miss.; John A. Doyle, B. & B. master, D. & H., Oneonta, N. Y.; Paul Eberst, supvr. B. & B., K. & M., Middlesport, Ohio; Albert Fink, supvr. B. & B., D. L. & W., Buffalo, N. Y.; H. H. Kinzie, supvr. B. & B., N. Y. N. H. & H., Taunton, Mass.; J. L. Pickles, div. engr., D. W. & P., Duluth, Minn.; H. C. Swartz, supt. B. & B., G. T., Montreal, Que.; P. N. Watson, supt. B. & B., Maine Central, Brunswick, Me., and J. C. Williams, supvr. B. & B., Ga., Decatur, Ga.

THE ROADMASTERS' ASSOCIATION

The following members have been selected by the executive committee for service on committees during the ensuing year, each committee chairman being authorized to add two additional members:

Methods of Renewing Ties and the Economical Relation of this Work to Track Maintenance—Chairman, J. P. Davis, roadmaster, Central Indiana, Anderson, Ind.; A. M. Clough, supervisor, N. Y. C., Batavia, N. Y.; C. H. Royer, supervisor, B. & O., Newark, Ohio, and C. F. Miller, supervisor, Penna., Titusville, Pa.

The Maintenance of Motor Cars—J. H. Hartley (chairman), assistant division engineer, Penna., Pittsburgh, Pa.; E. C. Buhrer, supervisor, T. & O. C., Kenton, Ohio; J. F. Markert, supervisor, C. & A., Joliet, Ill., and George Holm, supervisor, B. & L. E., Butler, Pa.

The Conservation of Labor Through the Use of Labor Saving Devices—George W. Morrow (chairman), supervisor, N. Y. N. H. & H., New Haven, Conn.; J. W. Powers, supervisor, N. Y. C., Rochester, N. Y.; J. M. Fair, supervisor, Penna., Philadelphia, Pa., and C. A. Joyce, supervisor, Erie, Paterson, N. J.

Section Gangs Versus Extra Gangs for Routine Maintenance Work—R. H. Smith (chairman), assistant division superintendent, N. & W., Roanoke, Va.; I. D. Talmadge, roadmaster, N. Y. O. & W., Middletown, N. Y.; George Kohn, roadmaster, C. R. I. & P., Joliet, Ill., and J. A. Roland, roadmaster, C. & N. W., Missouri Valley, Iowa.

Review the Practice of the Non-spacing of Ties and the Elimination of Slot-spiking of Joint Ties—F. L. McMillan (chairman), roadmaster, C. & A., Bloomington, Ill.; E. J. Boland, roadmaster, I. C., Freeport, Ill.; W. E. Davin, assistant roadmaster P. & L. E., Pittsburgh, Pa., and P. M. Dinan, supervisor L. V., Geneva, N. Y.

MAINTENANCE OF WAY CONVENTIONS

American Railway Bridge and Building Association, C. A. Lichty, secretary, C. & N. W., Chicago. Next annual convention, Cincinnati, October 17-19, 1922. Simultaneous exhibit by Bridge and Building Supply Men's Association, D. J. Higgins, secretary, American Valve and Meter Company, Chicago.

American Railway Engineering Association, E. H. Fritch, secretary, 431 South Dearborn street, Chicago. Next annual convention, Congress Hotel, Chicago, March 21-23, 1922. Simultaneous exhibit by the National Railway Appliances Association at the Coliseum, C. W. Kelly, secretary, Kelly-Derby Company, Chicago.

American Wood Preservers' Association, G. W. Hunt, secretary, Box 375, Madison, Wis. Next annual convention, Hotel Sherman, Chicago, January 24-26, 1922.

Maintenance of Way Club of Chicago, W. S. Lacher, secretary *Railway Maintenance Engineer*, Chicago. Evening meetings at the Auditorium Hotel on December 14, 1921, February 15, 1922, April 19, June 21 and August 16.

National Association of Railway Tie Producers, Warren C. Nixon, Western Tie & Timber Company, 905 Syndicate Trust building, St. Louis, Mo. Next annual meeting at Chicago, Hotel Sherman, on January 26-27, 1922.

Roadmasters' and Maintenance of Way Association of America, P. J. McAndrews, secretary, C. & N. W., Sterling, Ill. Next annual convention, Cleveland, Ohio, September 19-21, 1922. Simultaneous exhibit by the Track Supply Association, W. C. Kidd, secretary, Ramapo Iron Works, Hillburn, N. Y.

THE MATERIAL MARKET

WITH DAILY evidences of a restoration of railway purchasing activities, manufacturers are turning more and more to the railways as an outlet for their materials. The rail market, in particular, is showing activity, with recent orders aggregating 400,000 tons and 250,000 tons in immediate prospect. A number of orders are in excess of 100,000 tons. However, this renewed interest in buying, being restricted largely to the railroads, has not served to influence prices. As a consequence, the market is especially favorable for the railways at this time. This is the case with structural material. In spite of the fact that purchases in October were larger than in any month since May, 1920, the prices of plain materials are still on the downward grade.

Track materials are still showing a softening tendency, with both track spikes and track bolts being quoted at less than a month ago and with the price of angle bars given at $2.40 per 100 lb. in place of the nominal figure of $2.75, which was maintained for many months without change. In the wire market the leading manufacturers recently marked up prices from 2.50 to 2.60 cents for plain wire and from 2.75 to 2.90 for wire nails, but conditions have been unfavorable for this, and the indications are that the old prices rule for large orders.

	Prices in Cents Per Pound			
	October 20		November 20	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	2.40	2.78	2.25	2.63
Track bolts	3.50	3.78	2.25	3.63
Angle bars	....	....	2.40	2.40
Tie plates, steel	2.00	2 00	2.00	2.00
Tie plates, iron	....	2.00	....	2.00
Plain wire	2.60	2.98	2.60	2.98
Wire nails	2.90	3.28	2.90	3.28
Barbed wire, gal.	3.55	3.93	3.55	3 93
C. I. pipe, 6 in. or larger, per ton	....	44.10	....	44.10
Plates	1.65	1.75	1 55	1.75
Shapes	1.65	1.75	1.55	1.75
Bars	1.60	1.75	1.50	1.65

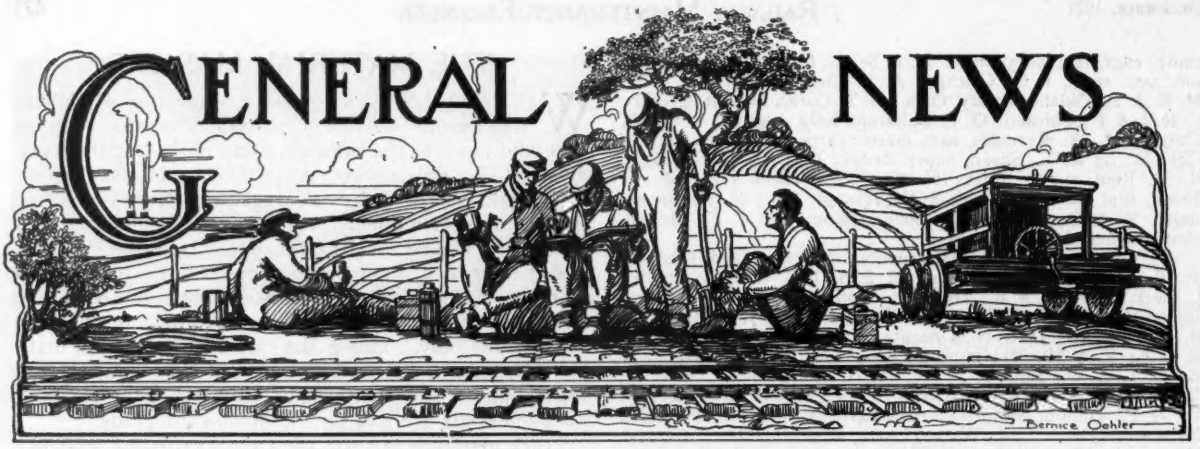
The scrap market shows no perceptible change from condition of a month ago.

	Per Gross Ton	
	Chicago	St. Louis
Relaying rails	$25.00 to $30.00	$30.00 to $35.00
Rerolling rails	14 00 to 14.50	13.00 to 13.50
Rails less than 3 ft. long	13.75 to 14.25	13.00 to 13.50
Frogs and switches cut apart	12.50 to 13.00	11.50 to 12.00
	Per Net Ton	
No. 1 railroad wrought	12.50 to 13 00	11.00 to 11.50
Steel angle bars	11.50 to 12.00	10.50 to 11.00

The lumber manufacturers, especially in the south, seem very much encouraged by the tendency of the market during the last two months. Southern mill prices for yellow pine are from $1 to $7 higher than a month ago. On the West Coast prices seem to be holding their own very well with some minor advances. One influence which has a tendency to improve the tone of the lumber market arises from the large number of car orders which the railroads have placed recently and which will call for a large quantity of car siding. In accordance with this the higher grades of lumber are showing a better tone than the lower grades and heavy timbers.

SOUTHERN MILL PRICES	October	November
Flooring, 1 x 4, B. and B., flat	$42.35	$49.15
Boards, 1 x 8, 14 and 16, No. 1	25.45	27.20
Dimension, 2 x 4, 16, No. 1	22.30	23 40
Dimension, 2 x 10, 16, No. 1 common	20.40	23.20
Timbers, 4 x 4 to 8 x 8, No. 1	18.40	22.75
Timbers, 3 x 12 to 12 x 12, No. 1	22.55	25.10
DOUGLAS FIR MILL PRICES		
Flooring, 1 x 4, No. 2, clear, flat	$21.00	$27.00
Boards, 1 x 6, 6 to 20, No. 1, common	10.50	10.50
Dimension, 2 x 4, 16, No. 1, common	11.50	11 50
Dimension, 2 x 10, 16, No. 1, common	11.50	11.50
Timbers, 6 x 6 to 8 x 8, No. 1, common	14.00	14.00
Timbers, 10 x 10 to 12 x 12, rough	14.00	14.00

The tie market is unusually quiet. Owing to the fact that some of the roads are overstocked with ties, they are now out of the market entirely, while the roads which are not in this condition are buying very conservatively and at prices far below those which the railroads were required to pay for requirements of cross-ties a year ago.



The business depression in Great Britain is such that in July of this year passenger traffic, exclusive of season ticket holders, had fallen 32.8 per cent from the figure for July of last year and freight traffic had declined 36.5 per cent.

The Chicago, Rock Island & Pacific has commenced preparations for the celebration of its fiftieth anniversary on October 10, 1922 and inquiries have been sent to various employees' associations and officers for suggestions for methods of commemorating that date.

A disastrous fire occurred at Weehawken, N. J., on November 3, when the freight piers of the Erie Railroad suffered damage to the extent of about $2,000,000, the loss including 15 freight cars and large quantities of merchandise in the storehouse and cars. Of the seven piers at this point, only three were left standing.

Statistics compiled by the Interstate Commerce Commission show that the number of stockholders of class 1 roads was 709,795 in 1920, of which 324,514 held stock in railways of the eastern district, 67,495 in railways of the southern district and 317,786 in railroads of the western district. The average holding was 10,269. According to these statistics the number of holders of railway stock has increased more than 81,865 in three years.

Of the total number of persons gainfully occupied in the United States, 3,066,305, or 7.4 per cent, were engaged in transportation in 1920, according to the Department of Census. Of this number 2,852,043 were men, a number which is equivalent to 8.6 per cent of all men gainfully occupied in the country, while 214,252 were women, a number which represents 2.5 per cent of the total number of women in the country gainfully occupied.

The reclamation plant of the Chicago, Rock Island & Pacific at Silvis, Ill., has effected a saving of $1,301,970 during the three years ending with 1920, according to C. H. Rost, general storekeeper. In 1918, the saving is reported as $467,947, which represents $6.75 for each ton of scrap. In 1919 the year's saving is reported as $473,623, or an equivalent of $8.10 for each ton of scrap and in 1920 a saving is reported of $360,398 or $6.07 for each ton of scrap.

In an action for personal injuries resulting from the derailment of a passenger train between Rahway and Elizabeth, N. J., due to the breaking of a rail from an internal transverse fissure, it was held by the Circuit Court of Appeals that the railroad was not liable on the grounds that the internal transverse fissure was not discoverable to the eye, that no other test of the actual breaking of a rail would have revealed the defect, that the rail was made by a reputable manufacturer, had been in use about five years or about one-third the normal life of such a rail, and that the track was inspected daily.

Four officers were killed and several injured on November 22 on the Atchison, Topeka & Santa Fe when a motor inspection car carrying 14 persons was derailed near Wickenburg, Ariz. The breaking of an axle while the car was traveling on a curve is said to have been the cause of the accident, following which the car plunged down an eight-foot embankment and was overturned. The dead are W. H. Oliver, engineer of the Grand division, Coast Lines; William Matthie, division superintendent; H. C. Storey, assistant division superintendent; William Bowman, roadmaster, and J. A. Jaeger, assistant division engineer.

The Liberty White Railroad, a line of 24 miles between McComb, Miss., and Liberty which was ordered abandoned by the Interstate Commerce Commission, has been sold for $30,000 to Hugh L. White of Columbia, Miss., and applications for authority to abandon other railroads to the amount of 305 miles, have recently been made as follows: Bangor & Arvastock, 9 miles of line from Brownsville Junction to Katahdin Iron Works; Hawkinsville & Florida Southern, 42 miles from Hawkinsville, Ga., to Worth, and 50 miles from Ashburn, Ga., to Camilla; Tennessee, Alabama & Georgia, its entire line of 80 miles; Pere Marquette, 6 miles on its Freeport Branch, 26 miles from Benton Harbor, Mich., to Buchanan, 20 miles from Haynor, Mich., to Sheridan, and 20 miles from Big Rapids, Mich., to White Cloud; and Delta Southern, 10 miles from Percy, Miss., to Richey, 14 miles from Elizabeth to Kergs Junction, and 28 miles from Itta Bena to Belzoni.

On September 16, P. St. J. Wilson, chief engineer of the Bureau of Public Roads, issued an order modifying an order issued on January 20, 1921, prohibiting the use of timber in highway bridges built under the Federal aid law. The new order authorizes the use of timber in cases where the local engineer finds it economically justifiable, providing the following conditions are observed: (a) Timber trestles or bridges constructed of creosoted material treated by the vacuum and pressure method; (b) timber floors constructed of creosoted planking treated by the vacuum and pressure method, laid laterally with a plain or tank treated wearing floor ("half-sole"); or laid laterally or longitudinally on edge, spiked together, and covered with a mastic wearing course; (c) timber floors, for light traffic where single floors are laid and not protected by any covering constructed of tank treated material or plain material, depending on whether plain timber is more likely to rot out or wear out.

The recent authorization by the Chicago, Burlington & Quincy of the expenditure of $15,000,000 for the purchase of freight cars, locomotives and passenger cars; the order placed by the Illinois Central for 1,000 refrigerator cars and its inquiry for 2,000 gondola cars, 500 convertible cars and 500 flat cars; the order placed by the Chicago, Milwaukee & St. Paul for 2,500 composite gondola cars; the order of the Southern Pacific for 50 locomotives; the order of the Atchison, Topeka & Santa Fe for 2,500 refrigerator cars and the Western Pacific for 1,000 gondola cars; and the inquiry by the Chesapeake & Ohio for 1,000 hopper cars; of the Seaboard Air Line for 2,000 cars of various types; of the Delaware, Lackawanna & Western of 500 cars; of the Grand Trunk of 200 refrigerator cars; of the great Northern for 500 refrigerator and 1,000 box cars, and of the Pere Marquette for 500 to 2,000 box cars, has aroused considerable interest as an indication both of the need which railroads of the country have for additional rolling stock and of their return into the market for equipment which manufacturers supply.

PERSONAL MENTION

GENERAL

R. A. Thompson, formerly district engineer on the Bureau of Valuation, Interstate Commerce Commission, with headquarters at San Francisco, has resigned, pursuant to the closing up of the district offices of the Valuation department, and will become chief engineer in charge of the construction of dams for the Wichita County Water Improvement District at Wichita Falls, Tex.

A. T. Mercier, who was recently appointed general manager of the San Diego & Arizona, with headquarters at San Diego, Cal., has gained most of his railway experience in the maintenance of way department. Born at New Orleans, La., December 11, 1881, Mr. Mercier attended Tulane University and shortly after the completion of his engineering studies in 1903, entered railway service with the Southern Pacific as a transitman and roadmaster's clerk at Los Angeles. In February, 1906, he was promoted from assistant gang foreman at Los Angeles to assistant engineer in charge of reconstruction work in the Colorado river territory, and held this position until March, 1907, when he was appointed general foreman and engineer of bridges and buildings in charge of steel bridge construction at Los Angeles. This position he held until June, when he was appointed engineer and general foreman in charge of terminal construction work, with headquarters first at San Pedro, Cal., and later at Los Angeles. From this position he was promoted in November, 1908, to assistant division engineer of the Los Angeles division, where he remained until November, 1911. From that date to November of the following year Mr. Mercier was assistant district engineer of the Southern district, with headquarters at Los Angeles, and from that date until August, 1913, held the position of division engineer of the San Joaquin division, with headquarters at Bakersfield, Cal., when he was transferred to the Los Angeles division. In February, 1917, he entered the operating department as assistant superintendent of the Shasta division and was subsequently promoted to superintendent of the Portland division, with headquarters at Portland, Ore., which position he was holding at the time of his recent appointment.

A. T. Mercier

Sir John Kennedy, consulting engineer, who died in Montreal, October 25, at the age of 83 years, was prominently associated with Canadian railway engineering during a portion of his career. His first connection with railway work occurred shortly after the completion of his engineering studies at McGill University, when he held various positions of minor importance on railway construction until his appointment as assistant city surveyer of Montreal in 1863. In 1871, following a brief connection with the Wellington, Grey & Bruce Co., as a division engineer on construction, Mr. Kennedy became chief engineer of the Great Western (of Canada), in which position he directed the construction of the Canadian Air Line and a number of minor branches (all of which are now a part of the Grand Trunk) and also directed the construction of Canada's first line of double track, the latter extending from Glencoe to Windsor. After his appointment as chief engineer of the Montreal Harbor Commission in 1875, which position he held until 1907, Mr. Kennedy no longer participated actively in railway work, but as a member of the Royal Commission appointed in 1886, he was often called upon to act as abritrator and consulting engineer on various railway matters.

William Gerig, assistant chief engineer of the Alaskan Engineering Commission, has resigned to engage in private engineering practice. Mr. Gerig was born in Boone County, Mo., in 1866, and entered the employ of the St. Louis-San Francisco as a topographer immediately following his graduation from the Missouri State University. In 1887 he was promoted to assistant engineer on the St. Louis-San Francisco and from 1888 to 1889 was chief engineer of the South Western Arkansas & Indian Territory railway. In 1892, Mr. Gerig entered the employ of the Illinois Central as assistant engineer and from 1909 to 1914 was vice-president and general manager of the Pocahontas & Eastern, following which he entered the employ of the Alaskan Government Railway, where he successively held the positions of consulting engineer, engineer in charge of the Southern division and assistant chief engineer.

ENGINEERING

A. Craine, whose appointment as district engineer, maintenance of way, of Missouri district of the Chicago, Burlington & Quincy, was announced in the November issue, was born in England in 1883 and entered railroad service in 1905, as a rodman on the Missouri Pacific. In 1908, he left this road to become a rodman on the Chicago, Burlington & Quincy and, through various promotions, became division engineer, with headquarters at St. Louis, Mo., which position he was holding at the time of his recent appointment.

H. R. Clarke, whose appointment as district engineer maintenance of way of the Nebraska district of the Chicago, Burlington & Quincy, with headquarters at Lincoln, Neb., was noted in last month's issue, was born in Ireland on November 15, 1882. He came to America with his parents in 1888 and graduated from Monmouth College in 1906. In 1907, he entered railway service as a rodman on the Chicago, Burlington & Quincy, later serving as instrumentman, and in 1908 was promoted to extra gang foreman. From July, 1909, to May, 1911, Mr. Clarke served as resident engineer on the construction of a line from Herrin, Ill., to Paducah, Ky., and in the latter month was promoted to roadmaster on the Aurora division, later being transferred to the Burlington and Hannibal divisions. In November, 1919, he was promoted to general roadmaster of the McCook division, which position he held at the time of his recent appointment.

James B. Akers, whose promotion to chief engineer maintenance of way and structures of the Southern, Lines East, with headquarters at Charlotte, N. C., was noted in last month's issue, was born at Danville, Va., on March 16, 1884. Following his graduation from Washington and Lee University in 1904, Mr. Akers entered railway service with the Southern as assistant supervisor of the Asheville division and was promoted to levelman on September 1, 1905, which position he held until March 1, 1906, when he became transitman. From January 1, 1907, until August 1, 1911, he served as assistant engineer and on the latter date was promoted to acting engineer maintenance of way of the Middle district and on September 1, 1911, was made engineer maintenance of way of the same district, which position he held at the time of his recent promotion as chief engineer.

James B. Akers

George H. Harris, engineer of track and maintenance of way of the Michigan Central, has been promoted to assistant chief engineer, with headquarters at Detroit, Mich. Mr. Harris was born at Toledo, Ohio, on July 17, 1878. Upon leaving the University of Michigan in 1902, he entered the employ of the Pennsylvania on its Chicago Terminal division. He left that road in 1903 to become an assistant division engineer of the Michigan Central with headquarters at Jackson, Mich., and, in 1905, he was promoted to division engineer with headquarters at Niles, Mich. From 1907 to 1910 he was in charge of the grade separation work of the Michigan Central and the Chicago, Rock Island & Pacific, at Joliet, Ill. He was appointed division engineer at St. Thomas, Ont., in 1910, and was transferred to Detroit, Mich., in 1912. In 1914 he was promoted to engineer of track and maintenance of way and from 1917 to 1919 he acted as assistant chief engineer, with headquarters at Detroit, necessitated by J. F. Deimling, assistant chief engineer, becoming acting chief engineer during the absence of Colonel Webb in military service in France. He returned to his former position in May, 1919, in which capacity he was serving at the time of his recent promotion.

G. H. Harris

James F. Deimling, assistant chief engineer of the Michigan Central, with headquarters at Detroit, Mich., has been promoted to chief engineer with the same headquarters, succeeding Col. Geo. H. Webb, whose death is noted elsewhere in these columns. Mr. Deimling was born on November 18, 1867. He entered railroad service in March, 1886, as a rodman on the Missouri Pacific, which position he left in September of that year to become assistant engineer with the W. V. McCracken Construction Company. He re-entered railroad service in November, 1887, as assistant engineer of the Chicago & West Michigan, with headquarters at Grand Rapids, Mich., and in 1890 he was appointed assistant engineer of the Detroit & Lansing, which position he held until March, 1897, when he became engineer maintenance of way, of the Lake Superior & Ishpeming, and chief engineer of the Marquette & Southern. He entered the service of the Pere Marquette on June 1, 1904, and was, successively, track engineer with headquarters at Detroit, until July 1, 1905, and division engineer maintenance of way with headquarters at Grand Rapids, until February, 1906, at which time he was promoted to chief engineer with headquarters at Detroit. In October, 1912, he resigned to become engineer of construction of the Michigan Central, with headquarters at Detroit. In December, 1913, he was promoted to assistant chief engineer, which position he was holding at the time of his recent promotion. Mr. Deimling served as acting chief engineer from June, 1917, to May, 1919, during the time that Colonel Webb was in military service.

J. F. Deimling

Howard M. Smitten, formerly assistant engineer in the valuation department of the Southern Pacific, and who was recently appointed bridge engineer of the Western Pacific, with headquarters at San Francisco, Calif., was born at San Jose, Cal., in 1878, and entered railroad service in May, 1900, as a rodman on the Southern Pacific. He held this position until 1902 when he was made structural draftsman in the maintenance of way department. A short time later Mr. Smitten left railroad service and entered the employ of various architects in San Francisco as a structural engineer and draftsman. He re-entered the employ of the Southern Pacific in 1906 as a structural engineer. In 1917 he entered the United States Army, where he remained until his discharge in 1919 as lieutenant-colonel of the 37th Engineering Regiment. Mr. Smitten then re-entered the service of the Southern Pacific as an assistant engineer in the valuation department, which position be held at the time of his recent appointment.

R. C. Pearson, whose appointment as district engineer maintenance of way on the Chicago, Burlington & Quincy, with headquarters at Alliance, Neb., was noted in the November issue, was born at Lincoln, England, March 27, 1877, and educated at Bellevue College. Prior to the completion of his college studies, Mr. Pearson was employed as chainman on government land surveys, levelman on drainage investigations for the Department of Agriculture, and during the summer of 1907 was employed as bridge construction gang timekeeper on the Chicago, Burlington & Quincy at Worland, Wyo. In October, 1908, Mr. Pearson entered the service of the C. B. & Q. as a rodman at Omaha, Neb., and in August of the following year was appointed division engineer on track inventory. This position he held until December of the same year when he was appointed division engineer on freight house and track construction at Omaha. In April, 1912, Mr. Pearson was then appointed division engineer at Alliance, Neb., the position he held at the time of his recent appointment.

BRIDGES AND BUILDINGS

Jacob F. Lockwood, whose promotion to general inspector of bridges of the Chesapeake & Ohio with headquarters at Richmond, Va., was announced in the November issue, was born at Peach Orchard, Ky., on September 14, 1886. Mr. Lockwood entered railway service as a carpenter on the Huntington division of the Chesapeake & Ohio on November 22, 1905, and remained in this position until January, 1911, when he was promoted to carpenter foreman in the construction department. On November 1, 1911, following a reduction in forces, he was attached to the carpenter forces as a hoisting engineer, serving in this capacity until July 16, 1916, when he was promoted to foreman of a system bridge force. On October 7, 1918, he was promoted to assistant supervisor of bridges and buildings on the Cincinnati division with headquarters at Covington, Ky., where he remained until his recent promotion to general inspector of bridges.

TRACK

G. Jenkins, acting roadmaster on the Canadian National, with headquarters at Neepawa, Man., has been assigned to other duties. **A. T. Herbert,** having returned from a leave of absence.

T. A. Allen has resumed his duties as roadmaster of the Deming district of the Southern Pacific, Pacific System, with headquarters at Deming, N. M., in place of **H. Collins,** assigned to other duties.

John W. Hruska, section foreman on the Minneapolis & St. Louis has been promoted to supervisor of track, with headquarters at Conde, S. D., succeeding **John A. Buck,** who has been transferred to Fort Dodge, Iowa, in place of **T. Torkelson,** deceased.

Geo. E. Lowe, whose promotion to roadmaster on the Delaware, Lackawanna & Western with headquarters at Elmira, N. Y., was noted in the November issue, was born at Danville, Pa., on August 11, 1880. Mr. Lowe's entire service has been with the Lackawanna, he having entered

the service of that road as a water boy at Danville on April 3, 1893, and remaining in continuous service ever since. On April 1, 1896 he became a laborer in the track forces where he served until promoted to section foreman at Pittston, Pa., on May 15, 1902. On May 1, 1906, he was made an extra gang foreman at Taylor, Pa., remaining in this position until April 1, 1907, when he was promoted to work train foreman with headquarters at Scranton, Pa. Slightly over a year later, he was promoted to yard foreman at Kingston, Pa., serving this point until January 12, 1910, when he was promoted to supervisor at Elmira, N. Y., remaining in this capacity until promoted to roadmaster as already noted.

PURCHASING AND STORES

S. J. DeGraeff has been appointed storekeeper of the Southern Pacific of Mexico, with headquarters at Empalme, Sonora, Mexico.

A. Ross has been appointed division storekeeper of the Erie with headquarters at Jersey City, N. J., and **M. H. Keyes** has been appointed to a similar position with headquarters at Buffalo, N. Y.

F. G. Prest, purchasing agent of the Northern Pacific, with headquarters at St. Paul, Minn., has been made director of purchases, a newly created office, with the same headquarters, and **R. J. Elliott,** assistant purchasing agent, with headquarters at St. Paul, Minn., will succeed Mr. Prest.

OBITUARY

D. J. McCoy, formerly resident engineer on the Atchison, Topeka & Santa Fe at Willard, N. M., died recently at Los Angeles, Calif.

George H. Webb, chief engineer of the Michigan Central, with headquarters at Detroit, Mich., died at Newton, Mass., on November 3. He was born in 1860 and entered railway service as a rodman on the Summerset and Cambria branch of the Baltimore & Ohio in 1880, following his graduation from the Pennsylvania Military Academy. In 1883, after serving also as a levelman and transitman on lines which are now a part of the Baltimore & Ohio, Mr. Webb became city engineer of Johnstown, Pa., and later engineer of the Johnstown Steel Rail Company. Re-entering railway service in 1885, Mr. Webb was employed as assistant engineer and locating engineer on several branch lines of the Chicago, Burlington & Quincy until 1888 when for a year he became associated with the Seattle, Lake George & Eastern (now a part of the Northern Pacific) and the Puget Sound, Skagit & Eastern as a location and construction engineer. In 1889, Mr. Webb left for Chile where he had charge of construction on the government railroad until 1893 when he returned to this country and engaged in private engineering practice. In 1898, Mr. Webb was appointed chief engineer of the Cincinnati, Georgetown & Portsmouth and a year later became roadmaster on the Cleveland, Cincinnati, Chicago & St. Louis, which position he held on this road and on the Chcaigo & Alton until 1901, when he became engineer in charge of construction of the St. Louis, Iron Mountain & Southern at Baring Cross, Ark., for a year. Entering the service of the Michigan Central in 1903 as an engineer in charge of location work, he served in the successive capacities of engineer of the Middle division, and assistant chief engineer in charge of surveys, construction and maintenance until 1905, when he was promoted to chief engineer. In 1911, Mr. Webb was also appointed chief engineer of the Detroit River Tunnel Company and served in both capacities until 1917 when he entered military srvice as lieutenant-colonel the 16th Railway Engineers. Mr. Webb remained in this service approximately two years, during which he was commissioned a colonel and in recognition of which he was awarded the Distinguished Service Medal, decorated by the president of France and made an officer in the order of the Black Star, and a member of the Legion of Honor. Following the war, he then resumed his duties as chief engineer of the Michigan Central.

George H. Webb

James S. Browne, assistant to the engineer maintenance of way of the New York, New Haven & Hartford, whose death was noted in last month's issue of the *Railway Maintenance Engineer,* was born at Indiana, Pa., on November 14, 1861. Mr. Browne was educated as a civil engineer and entered railway service as a chairman on the Northern Pacific, serving with that road from June, 1880, to December of the same year. He then entered the employ of the New York West Shore & Buffalo as an inspector in March, 1881, remaining in this position until April, 1884. In June of that year he took a position as rodman on the New Jersey Junction Railroad, remaining until September when he left that road to go with the Brooklyn Elevated Railroad as a transitman, where he was employed until October, 1886. In August, 1889, he entered the employ of the New York, Providence & Boston as a transitman, being later promoted to assistant engineer and continuing in this position when that road was merged with the New York, New Haven & Hartford in 1893. In June, 1903, he was promoted to division engineer with headquarters at Providence, R. I., and on June 1, 1914, to assistant to the engineer maintenance of way with headquarters at New Haven, Conn.

James S. Browne

The Alaskan Engineering Commission has recently obtained an appropriation of $4,000,000 from Congress to complete the construction of the Alaskan Government Railroad. Upon the expenditure of this money, the road will have cost a total of $56,000,000. Less than 20 miles of track remained to be laid on November 2 in order to complete the connection between Seward on the coast and Fairbanks on the interior, a total of 525 miles of railroad now being in operation with train service twice a week in each direction. The work of laying the remaining track is still in progress and, with the exception of the connection over Riley Creek, is expected to be completed by December. At this point a steel viaduct is to be constructed, the steel for which has already been shipped and the erection of which is expected to be completed by February.

Pursuant to the Plan of Reorganizing the Bureau of Valuation of the Interstate Commerce Commission, the work is now being centralized in Washington, the district offices are to be closed and the engineering board abolished. In the place of the board, H. M. Jones, formerly district engineer at Chattanooga, has been appointed supervising engineer at Washington and will have a staff similar to the staff formerly maintained by the district engineers. The Chicago office is to be maintained until December 1, but the Kansas City, San Francisco and Chattanooga offices have been closed. Approximately 300 employees of the district offices will move to Washington. A considerable number of men will remain in the field until the end of the year when it is expected that all field work will have been completed. Similarly to the engineering section, the land section is to be centralized at Washington and the service of the valuation attorneys and their forces terminated.

CONSTRUCTION NEWS

The Alaska Anthracite has applied to the Interstate Commerce Commission for authority to extend its main line from its present terminus on Canyon Creek to a point 1¾ miles distant in a northeasterly direction.

The Alaska Railway Company has applied to the Interstate Commerce Commission for authority to issue 2,500 shares of stock to provide funds for the extension of its main line from the present terminus.

The American Railway Express will construct an addition to its stable at Tulsa, Okla., and remodel its present structure, at an estimated cost of $16,000.

The American Railway Express will construct a one-story express building at Lima, Ohio. This building will be 21 ft. by 100 ft. and will cost approximately $25,000.

The Atchison, Topeka & Santa Fe has closed bids for the construction of an addition to its Alvarado Hotel at Albuquerque, N. M., to cost about $300,000 and has awarded a contract to Jerome Moss, Chicago, for alterations and repairs to its grain elevator at Chicago. This company contemplates the construction of three oil storage tanks at Argentine, Kan., and will install an air compressor in its main power house at Cleburn, Tex.

The Atchison, Topeka & Santa Fe will construct a coal chute at Amarillo, Tex.

The Belt Railroad (Indianapolis) in conjunction with the city of Indianapolis, contemplates elevating its tracks from the White river on the northwest side of that city to Michigan street, on the east side.

The Boston & Maine has awarded a contract to the Ogle Construction Company, Chicago, for coal handling machinery to be used in connection with a coaling station which will soon be erected at Concord, N. H., by company forces.

The Canadian National will construct an earth dam at Rivers, Manitoba, and a water reservoir at Edson, Alberta. This company contemplates grade revision at Edmonton, Alberta, to place the tracks of the Canadian National and the Grand Trunk Pacific on the same grade, and also contemplates the construction of a new depot at this point. The grade revision will involve lowering of the Grand Trunk tracks 16 feet from the end of the trestle at 58th street to 74th street and raising of the Canadian Northern tracks seven feet for a distance of 2,000 feet at a cost of approximately $250,000. The work will also involve the construction of subways at Fort Trail and Norton streets. The plans for the new depot provide for a site extending for two blocks east of One hundred-first street, giving a three-way approach. This construction will involve the closing of three streets and the construction of two subways.

The Canadian Pacific has awarded a contract to Anglin-Norcross, Ltd., Quebec, for the construction of a 17-story addition to the Chateau Frontenac, its hotel at Quebec. The structure will be of brick, stone and steel and will involve an expenditure of approximately $3,500,000.

The Chesapeake & Ohio will construct an embankment and track, 1,695 ft. long at Huntington, W. Va., for the storage of steel car parts and contemplates the erection of a steel shed and platform also for storage purposes in the same city.

The Chicago & Alton has awarded a contract to Mulville Brothers, Alton, Ill., for the construction of a second track from Godfrey, Ill., to Brighton, a distance of six miles, and from Roodhouse, Ill., to Manchester, a distance of five miles. This work will involve the expenditure of approximately $362,000.

The Chicago, Burlington & Quincy has awarded a contract to the Materne Manufacturing Company, St. Louis, for the installation of a heating system and a locomotive boiler washout plant in its new engine house at Centralia, Ill.

The Chicago, Ottawa & Peoria, in conjunction with the Chicago, Rock Island & Pacific, LaSalle county and the state of Illinois, contemplates the construction of a viaduct over its track and those of the Rock Island at Moriarity Hill, near Ottawa, Ill.

The Chicago, Ottawa & Peoria, a road of 106 miles, has been requested by the city of Ottawa, Ill., to abandon its bridge over the Fox River at Ottawa and to join the city in rebuilding the city's bridge, the proposed city-railroad bridge to be constructed of a width equal to that of the street. This company has objected and the matter has been brought before the Illinois Commerce Commission.

The Chicago, Rock Island & Pacific has awarded a contract to T. S. Leake & Company, Chicago, for the construction of a mill building at Pratt, Kan.

The Chicago Union Station Company is accepting bids for four water tube boilers to be installed in its boiler house at Chicago, two of the boilers to have not less than 6,000 sq. ft. of heating surface and the remaining two not less than 3,000 sq. ft.

The Chicago Union Station closed bids November 17 for 2,600 sq. yd. of concrete track slabs.

The Dallas-Terrell has awarded a contract to Allhands & Davis, Kansas City, Mo., for grading and bridge work on its new line between Dallas and Terrell, Tex., a distance of about 34 miles.

The Galveston, Harrisburg & San Antonio contemplates the enlargement of its shops at El Paso, Texas, to accommodate new equipment.

The Great Northern has been petitioned by the Greater Rosebud Association, representing four counties in Southern South Dakota, known as the Rosebud Area, to extend its line from Huron, S. D., about 150 miles in a southwesterly direction, across the Missouri river, and into this area. This company in conjunction with the Northern Pacific, is negotiating with the city of Minneapolis, Minn., for extensive grade separation work.

The Illinois Central has closed bids for the construction of a freight house at West Frankfort, Ill., to cost about $50,000, and is receiving bids for the construction of a frame storehouse at Clinton, Ill. In addition to this work the company also contemplates enlarging the drying facilities of its elevator E at New Orleans, La., a work which will involve an expenditure of approximately $20,000 and which will be performed by company forces.

The Illinois Terminal has applied to the Interstate Commerce Commission for authority to extend its lines from Formosa, Ill., to O'Mallon, a distance of 14 miles, and its application has been passed upon favorably by the examiner.

A Los Angeles syndicate, of which Mr. Chandler, managing editor of the Los Angeles Times, and General Sherman of that city are members, contemplates the construction of a railroad line between Farmington, the terminus, a branch line of the Denver & Rio Grande in northwestern New Mexico, and Gallup, for the purpose of developing a territory known as the San Juan Basin, residents of which are to furnish land valued at $2,500,000 while the syndicate will contribute $1,500,000 cash. It is reported that 60 per cent of the required land has already been provided.

The Minneapolis & St. Louis contemplates the construction of a one-story repair shop at its Cedar Lake shops, Minneapolis, Minn.

The Missouri, Kansas & Texas has awarded a contract to T. L. Johnson, Sedalia, Mo., for the reconstruction of its reclamation plant at Parson, Kan., which was destroyed by fire on September 17, at an estimated loss of $850,000. This company has also awarded a contract to H. D. McCoy, Cleburne, Tex., for the reconstruction of its freight station at Oklahoma City, Okla., which was recently destroyed by fire and for the construction of a one-story machine shop, 30 ft. wide by 50 ft. long, at Houston, Texas.

The Missouri Pacific, which was noted in the November issue, as contemplating the construction of two brick car

repair sheds, 40 ft. by 500 ft. at St. Louis, Mo., has awarded the contract for this work to Joseph E. Nelson & Sons, Chicago.

The Missouri Pacific has awarded a contract to Joseph E. Nelson & Sons, Chicago, for the construction of a pumping station and water treating plant at Fort Scott, Kan.

The Montana, Wyoming & Southern has awarded a contract to the W. L. Johnson Company, St. Paul, Minn., for a 50-ton single track reinforced concrete coaling station, equipped with Howlett Construction Co. machinery.

The Nacogdoches & Southeastern contemplates extending its line 28 miles southwest from Nacogdoches, Texas, to a junction with the Atchison, Topeka & Santa Fe.

The New York, New Haven & Hartford has made arrangements with the American Creosoting Company, Inc., Louisville, Ky., to construct and operate at New Haven, Conn., a timber treating plant capable of treating 1,500,000 ties annually. Until the last few years the tie requirements of the New Haven has averaged about 2,000,000 annually, but with the disappearance of chestnut and other desirable woods the annual needs have threatened to increase to about 3,000,000. While the latter woods are produced locally and are of recognized value for cross ties if subjected to preservative treatment, any program of preservation heretofore, has necessitated their being shipped to distant points for this treatment. With a treating plant at New Haven, however, it will now be possible to utilize the cheaper grades of timber without being compelled to look for preservative treatment elsewhere. Aside from the saving which this installation is expected to effect in eliminating the expense involved in shipping such ties away for treatment, it is expected that the plant will enable the company to reduce the annual consumption of ties at the present time about one-half.

The Pennsylvania is having a coal thawing plant built at South Amboy, N. J., by the Eastern Coal Dock Company, Cleveland, Ohio.

The Portland, Astoria & Pacific, a subsidiary of the Oregon-American Lumber Company, Portland, Ore., control of which has been acquired recently by the Central Coal & Coke Company, Kansas City, Mo., is constructing, through its parent company, a railroad line 32.5 miles long, extending from Wilkesboro, Ore., into a timber tract owned by the above company. Work is expected to be completed early next year. It is estimated that the entire cost, including equipment, will be approximately $2,600,000.

The Redlake Northern Construction Company, Bemidji, Minn., contemplates the construction of a 130-mile logging road in northern Minnesota, to run northwest from Redby, Minn., through the Redlake Indian Reservation, connecting Grygla and Roseau, and terminating at Grand Junction on the Canadian border. The entire construction of this line will involve an estimated expenditure of $2,000,000, and plans are now under way for commencing the construction of 13 miles of this road during December.

The San Antonio & Aransas Pass noted in the November issue as contemplating the erection of a freight and passenger station at Poth, Tex., at an estimated cost of $8,300, has awarded the contract for this work to W. H. Orth, San Antonio, Tex.

The Southern Pacific contemplates the construction of a levee to front its yards at Algiers, New Orleans, La., this construction to involve an expenditure of approximately $185,000. Pursuant to the interest of the public in this levee, it is expected that the Orleans Tax Levee Board will contribute $25,000 to the construction of this project and a formal agreement to this end is now under consideration by the two organizations.

The Sewell Valley, which was noted in the November issue as contemplating the erection of a shop building at Rainelle, W. Va., has placed an order for this building with the Truscon Steel Company, Youngstown, O.

The Southern Pacific of Mexico contemplates extending its line from Tepic, Calif., to Guadalajara, Mex., a distance of about 100 miles. When completed this extension will afford a rail connection with the National Railways of Mexico.

The St. Louis-San Francisco will soon accept bids for the construction of a station at Francis, Okla., and has awarded a contract to the Howlett Construction Company, Moline, Illinois, for a 300-ton reinforced concrete coaling station to be erected at Newburg, Mo. This company, which was noted in the November issue as having received bids for the construction of a one-story machine shop, 103 feet by 40 feet, at St. Louis, Mo., has awarded the contract for this structure to the Globe Construction Company, St. Louis, Mo. This company contemplates the construction of a new hospital at Springfield, Mo., to cost about $200,000. This building will be a three-story structure of brick, stone and reinforced concrete construction and is being erected through its Employees' Hospital Association. This company closed bids November 19, for the remodeling of its Harvey Eating House at Sapulpa, Okla.

The Texas & Pacific, in conjunction with the Missouri Pacific and the Kansas City Southern, has prepared tentative plans for a union station at Texarkana, Ark.

The Washington, Brandywine & Point Lookout has made preparations for the construction of a 12-mile line from Mechanicsville, Maryland, to Hollywood. The new line will be laid with 80-lb. steel and the work will be done by company forces.

The Wenatchee Southern has recently been organized to construct and operate 132 miles of railroad along the Columbia river between Wenatchee, Wash., and Kennewick, for the benefit of fruit growers. Connections will be made with the Northern Pacific and the Spokane, Portland & Seattle at Pasco, Wash.; with the Oregon-Washington Railroad & Navigation Company at Kennewick and with the Great Northern at Wenatchee. Surveys have been completed and most of the right-of-way necessary for the construction has been purchased.

The Yazoo & Mississippi Valley has filed an application with the Louisiana Public Service Commission for permission to erect a new passenger station at Baton Rouge, La.

The Yucca-Boulder Canyon is an electric line whose construction is now under consideration, this line to extend from a point on the Atchison, Topeka & Santa Fe Coast Lines, near Yucca, Ariz., north to Boulder Canyon on the Colorado river, via Oatman, Ariz., and Katherine. G. P. Mohler of Needles, Cal., is interested in the project.

EQUIPMENT AND SUPPLIES

The Atchison, Topeka & Santa Fe has awarded a contract for one 55,000-bbl. steel tank, 115 ft. in diameter and 30 ft. high, and one 152,000-gal. tank, 24 ft. in diameter by 40 ft. high, to the Graver Corporation, Chicago, to be erected at Clovis, New Mexico. Both tanks are for the storage of fuel oil for oil-burning locomotives.

The Canadian Pacific has ordered 32,000 tons of 100-lb. steel rail from the Algoma Steel Corporation, this rail to be manufactured immediately upon the production of 25,000 tons called for on a previous order.

The Chicago & Alton has awarded a contract for 201 tons of steel for approaches to a freight house at Chicago to the American Bridge Company, Chicago, and has ordered 10,000 tons of rails from the Illinois Steel Company.

The Chicago, Burlington & Quincy has awarded a contract to the American Bridge Company for 126 tons of girder I-beams for bridges at Wichita Falls, Tex., and Denver, Colo., and a contract for three 55-ft. girder spans, 100 tons, to the McClintic-Marshall Company, Pittsburgh.

The Great Northern awarded a contract for 485 tons of steel for a drawbridge at Delta, Wash., to the Milwaukee Bridge Company, Milwaukee, Wis., and is inquiring for prices on one heavy-duty all-steel, No. 3, self-propelling pile-driver, capable of handling concrete piles weighing 8,000 lbs., with a driving radius of not less than 20 ft. and equipped with a locomotive type boiler, a steam hammer and a 4,000-lb. drop hammer, a Pyle electric headlight and air brake and to be self-propelling. This company is also inquiring for one 40-ton steam locomotive crane mounted upon a 24-ft.

car having telescopic outrigger system and equipped with 40-ft. radius straight boom, pile-driver truss and leaders, special horizontal fire box type boiler, double acting steam hammer, and 2,750-lb. drop hammer.

The Imperial Japanese Government Railways, through Suzuki & Company, New York, have ordered 200 tons of 100-lb. rail and 5,000 tons of 75-lb. rail from the U. S. Steel Products Company and have closed bids through Mitsui & Company, New York, for 1,800 tons of 60-lb. rail and 4,700 tons of 75-lb. rail. Through Suzuki & Company this company has also ordered 66,000 tons of 60 and 75-lb. rail from the Consolidated Steel Corporation.

The Jamacia Government Railways will shortly require a steam shovel of 1 or 1½-yd. capacity; shovels; picks; track jacks; rail tongs and other track tools and construction materials for a line extension involving an expenditure of some $688,000.

Mitsui & Company, New York, are inquiring for 900 tons of 16-lb. rail, 1,500 tons of 60-lb. rail and 700 tons of 60-lb. rail, all for export to Japan.

The New York Central closed bids November 25 for its requirements of rails, bids having been called for on a quantity not to exceed 200,000 gross tons of open-hearth steel rail of 120, 115, 105, 90 and 80-lb. Dudley sections and 100, 90 and 85 A. S. C. E. sections, together with five per cent of second quality rails and the necessary angle bars. This company also received bids until December 1, for its present requirements of structural steel and castings for repairs to bridges on the Syracuse and Pennsylvania divisions; also galvanized fence and fence posts; trailer wheels and axles for repairs to 80-ft. and 85-ft. turntables, splice bars for 80-lb. and 100-lb. rail; rigid manganese hogs, and track switches.

The Norfolk & Western closed bids November 30, for two lots of open hearth steel rails, one for 24,780 tons and the other for 15,220 gross tons.

The Philadelphia & Reading recently received bids on 28,000 tons of fabricated steel for use on nine bridges.

The Southern Pacific has ordered 44,600 tons of open hearth rails from the Tennessee Coal, Iron & Railroad Company, mostly of 90-lb. section.

The report of the Interstate Commerce Commission on railroad accidents and casualties in the United States for 1920 shows that there were 6,958 fatalities and 168,308 injuries from all causes. Compared with previous years the number of fatalities is practically the same as for 1919, but is less by 3,434 than in 1911. Of the total number killed in 1920, 6,495 resulted from train and train service accidents and of these, 264 were passengers, 2,107 were employees on duty, 91 were employees not on duty, 1,867 were fatalities at highway crossings, etc., to persons not trespassing, and 2,166 were fatalities to trespassers. Compared with 1911 substantial decreases occurred in each of the several classes of fatalities with the exception of those occurring at highway crossings, etc., notwithstanding that in the nine years' period from 1911 to 1920, the number of employees has increased from 1,599,854 to 2,031,927; the passengers carried one mile from 32,371,444,793 to 46,724,880,000; and the ton miles of traffic handled from 249,843,166,302 to 409,970,656,000.

The largest reduction in fatalities occurred among trespassers, the 2,166 trespassers killed in 1920 being less by 3,118 or 60 per cent than the number killed in 1911, and 387 or nearly 20 per cent less than the number killed in 1919. With respect to the casualties at grade crossings, the report shows that the number of fatalities from all causes has steadily decreased from 1,969 in 1917 to 1,791 in 1920, that the number of injuries has steadily increased from 4,764 in 1917 to 5,077 in 1920, and that the total number of casualties to occupants of automobiles has increased steadily from 4,083 or 59 per cent of all the highway crossing casualties in 1917 to 5,250 or 76 per cent of all the casualties in 1920. Of the 36,313 train accidents occurring during the year the report shows that 10,110 were collision, 22,477 were derailments and 3,726 were of a miscellaneous nature, all of which are reported to have wrought $34,129,860 damage to cars, engines and roadway.

SUPPLY TRADE NEWS

GENERAL

The F. C. Richmond Machinery Company, 117 West Second street, Salt Lake City, Utah, has been appointed representative of the Orton & Steinbrenner Company, Chicago.

The Decatur Bridge Company, Decatur, Ill., has moved its Chicago office from 110 South Dearborn street to the Continental and Commercial Bank Building.

The United States Cast Iron Pipe & Foundry Company, Burlington, N. J., has opened an office at 811 Dixie Terminal building, Cincinnati, Ohio, in which **P. T. Laws,** assistant works manager, now has his headquarters and of which **Harold G. Henderson** is sales manager.

The Bucyrus Company, South Milwaukee, Wis., has moved its New York City office to 30 Church street and placed **E. G. Lewis** in charge as eastern sales manager, effective December 1. **M. J. Woodhull** has been appointed Central sales manager to succeed Mr. Lewis in charge of the Chicago office, and **E. R. Weber** has been appointed northern sales manager, at Minneapolis, to succeed **J. N. Gawthrop,** who will become associated with Mr. Lewis in New York.

PERSONAL

Walter C. Carroll, assistant general sales manager of the American Sheet & Tin Plate Company, Pittsburgh, Pa., has been appointed vice-president of the Inland Steel Company.

Ben L. Whitney, formerly with the Byers Co., has opened an office at 528 Detroit Savings Bank building, Detroit, Mich., where he will represent the **Orten & Steinbrenner Company** in that territory.

G. H. Jones, vice-president and one of the founders of the **Inland Steel Company,** Chicago, contemplates retiring from active service in the company about Jan. 1, 1922. He will retain his interest in the company, however, and will continue as a director and a member of the executive committee.

M. G. Gregg, who has been connected with the general sales department of the Lackawanna Steel Company for the past two years, has been appointed district sales manager with headquarters at Detroit, Mich., succeeding **C. H. Hobbs.**

Robert A. Ogle, president of the Ogle Construction Company, Chicago, died on November 2. He was born at Spaulding Springs, Mo., on November 16, 1865, and was engaged in general building contracting at Monroe City, Mo., until 1898 when he organized and became director of the Safety Fund Life Association, an organization which subsequently became the Missouri State Life Insurance Company. In 1903, Mr. Ogle became connected with an engineering and construction company at St. Louis, Mo., which specialized in railroad construction work. Leaving that company in 1906, Mr. Ogle entered the service of the Otto Gas Engine Works, with headquarters in Chicago, with which he was engaged primarily in water service and coaling station construction. In 1911, Mr. Ogle organized the Ogle Construction Company and was actively identified with the control and operation of this company until his death as noted above.

Robert A. Ogle

This shovel went through 80 miles of granite

HERE'S a Wood's Mo-*lyb*-den-um Shovel which has gone through 80 miles of granite and has lifted 3,485 tons. Other well-known shovels, representing the highest grade of their respective makers, went out of commission after being forced through only 15 miles of granite and lifting approximately 700 tons.

These are some of the facts which have been set forth by a patented shovel testing machine, operated at the Wood Shovel and Tool Company's factory.

This testing machine consists of a box which holds 2" and 4" red granite rocks. Wood's Mo-*lyb*-den-um Shovels, as well as other shovels, were arranged on the spindle as shown in the illustration. A graphic wattmeter is used to maintain load, so that each and every test is identical. A cyclometer is used to record the number of revolutions made in the test as well as the amount of material shoveled.

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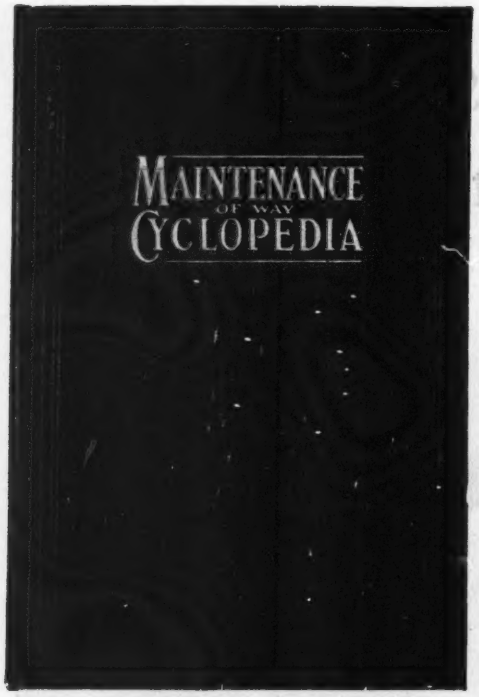

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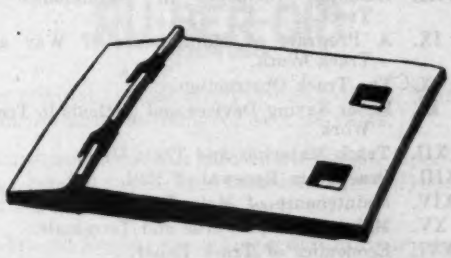

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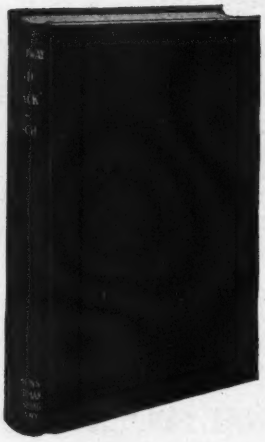

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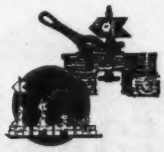

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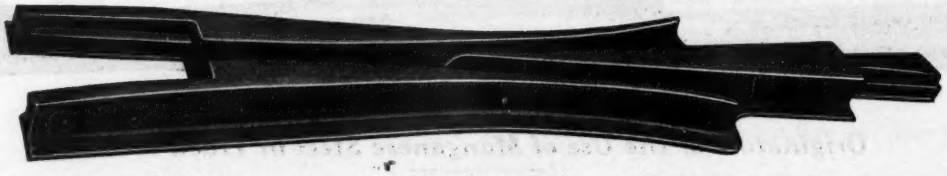

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